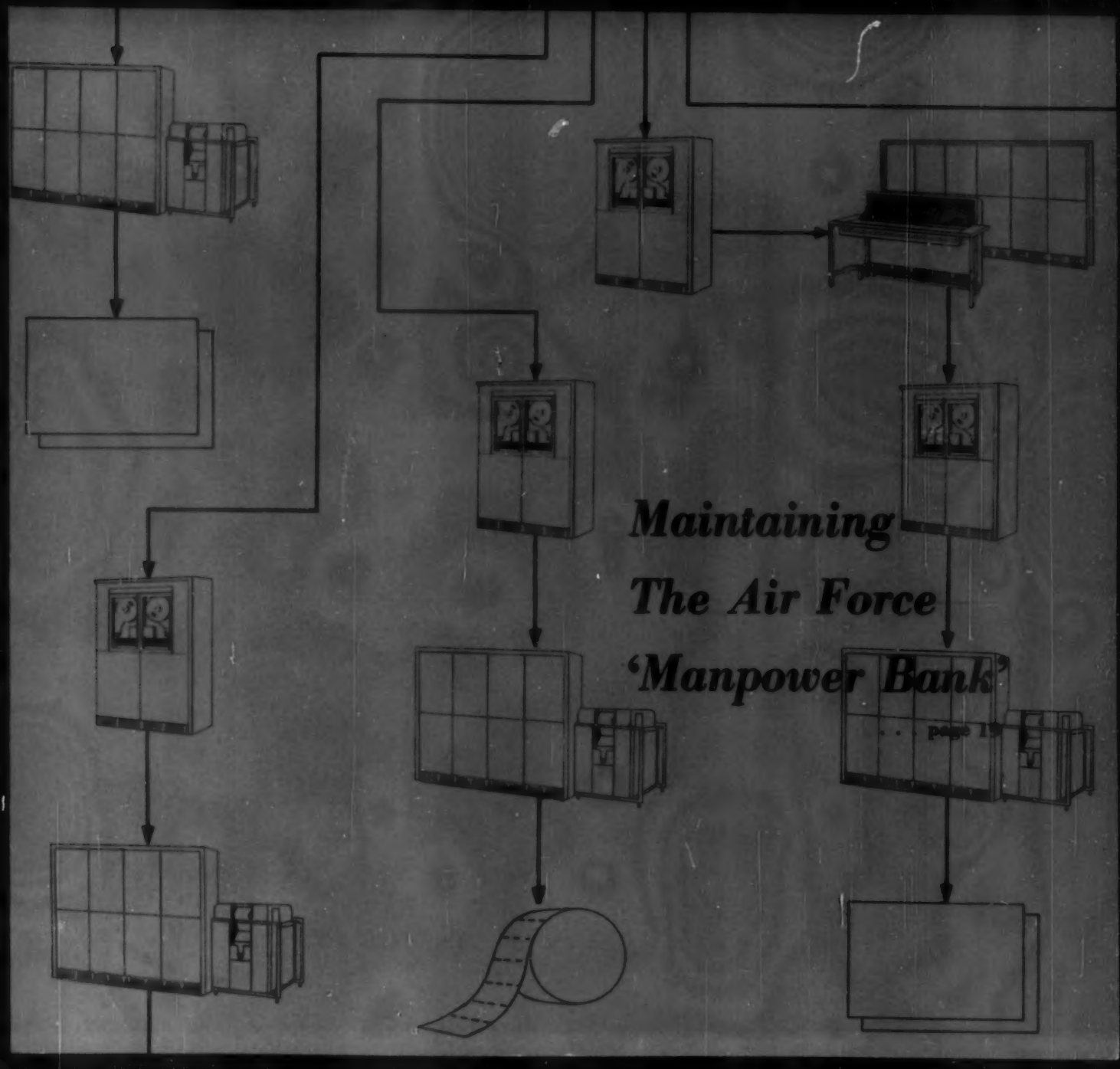
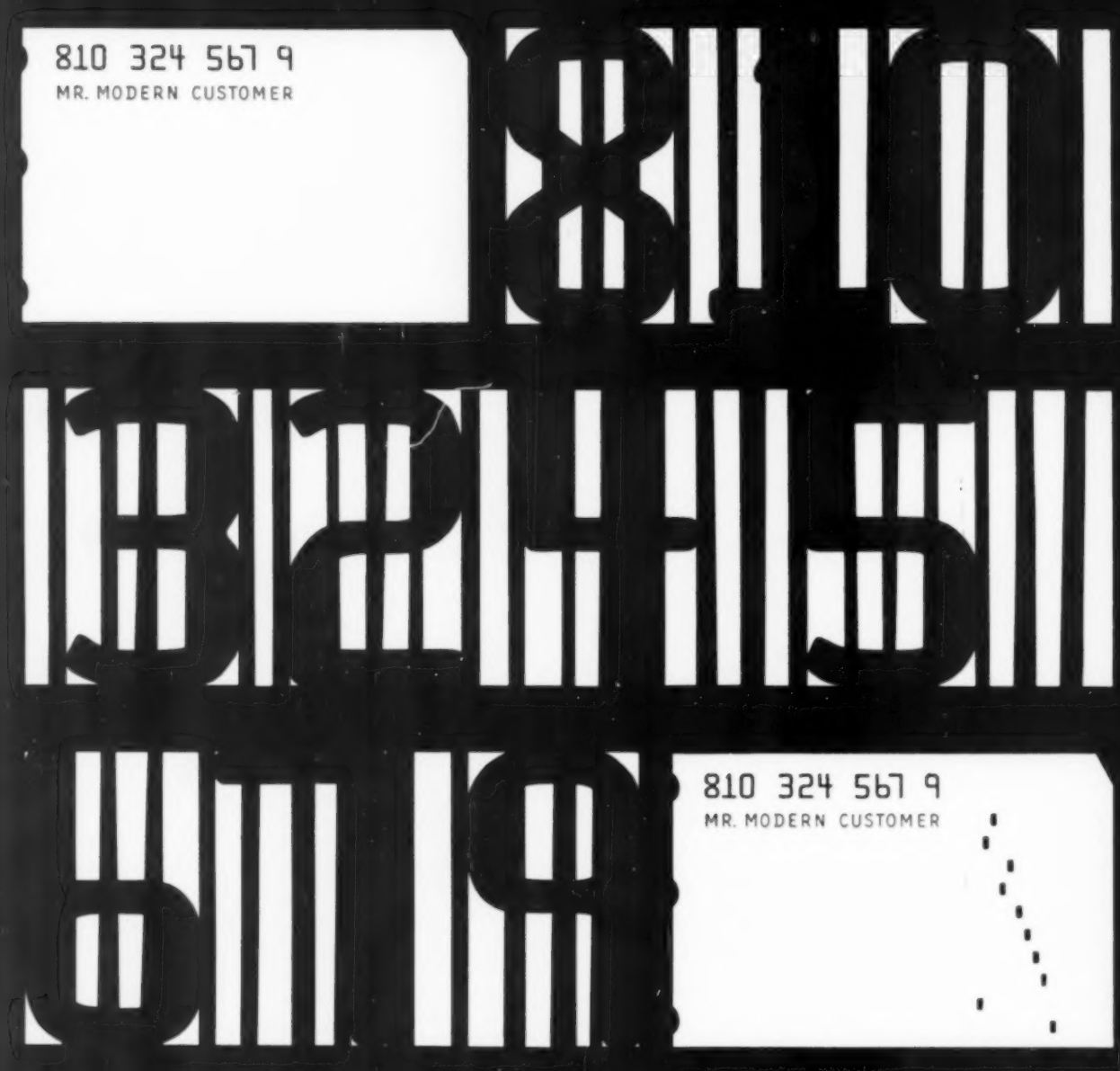
August 1960

MANAGEMENT *and* BUSINESS AUTOMATION



Maintaining The Air Force 'Manpower Bank'

. . . page 19



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MANAGEMENT *and* BUSINESS AUTOMATION

August, 1960
Vol. 4, No. 2

New ideas, developments, applications, results, and the human impact of business automation in commerce, industry and government.

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For More Information Circle Reader Service Card No. 154

Scanning the Issue

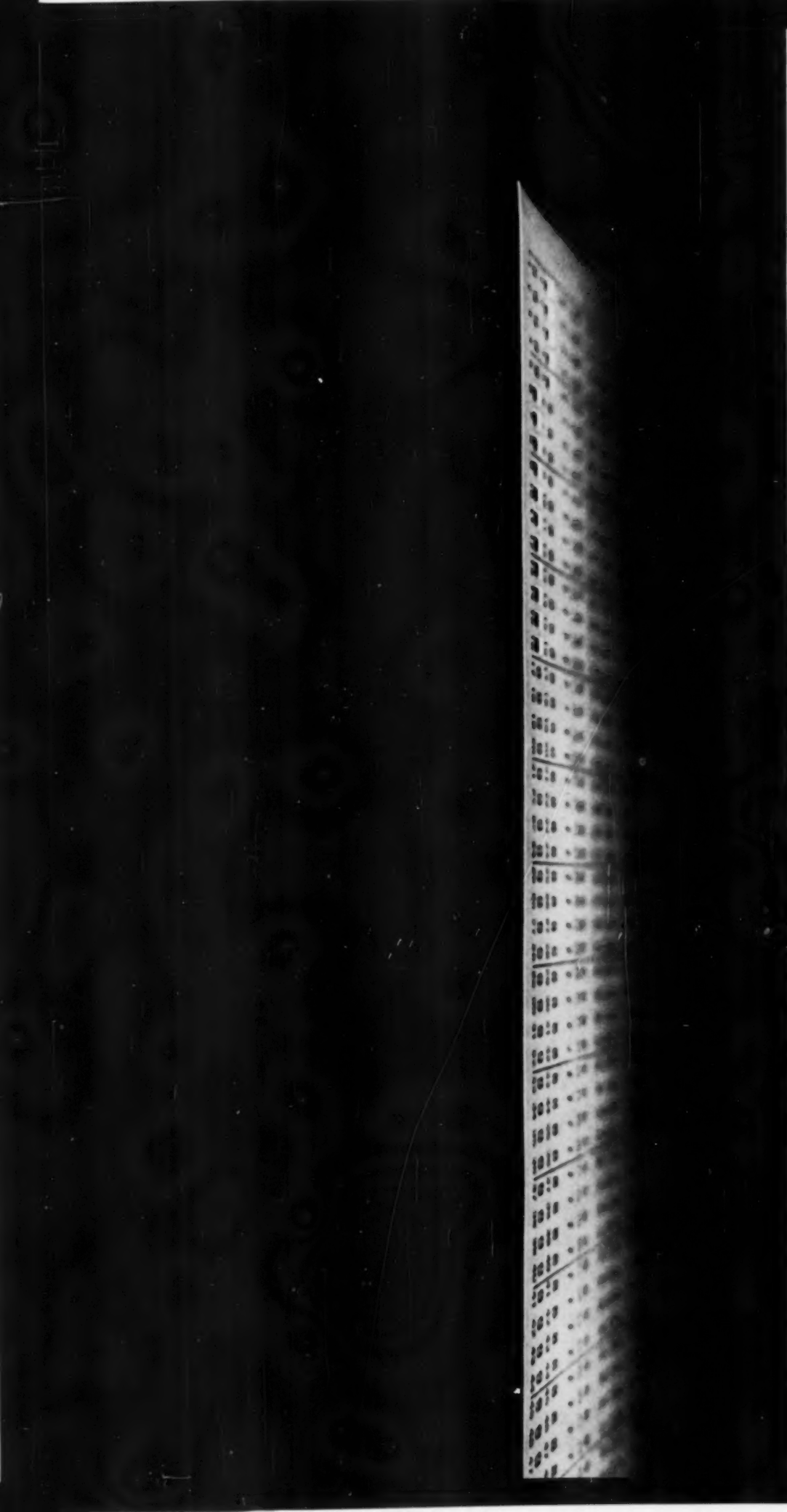
There is a certain satisfaction which comes from the realization that the United States armed forces are well aware of the need for speed if any emergency should arise. **The Air Force Automates Its "Manpower Bank,"** page 19, provides evidence of this awareness. It is also satisfying to note that business data processing—the routine job of record-keeping—is playing a major role in helping the Air Reserve Records Center to operate at peak efficiency. Management, here, really puts a computer system to work.

In its look at the American Management Association, **Teaching Management How to Manage,** page 22, MBA, picked up some facts and figures covering its over-all operation. During the 1958-59 fiscal year, the AMA found it held 1,114 meetings with a total attendance of 59,035. About 22,000 attended management seminars on 375 different subjects. Twenty-six large-scale conferences were held in New York, Chicago and Los Angeles. During that year the AMA academy also enrolled its 4,500th executive, and its annual summer program on the Colgate University campus attracted more than 1,000 executive "students."

Anyone who has ever wandered into the realm of queuing, Monte Carlo, linear or parametric programming, without a scorecard or at least two courses in higher mathematics, understands the need for "plain talk" about Operations Research. R. Hunt Brown explains **Operations Research—What, Why, Where and How,** page 30, in business language. He admits that the "Technicalese" spoken in conjunction with OR is foreign even to him, but he emphasizes that the importance of this comparatively new form of scientific management is not to be ignored. Mr. Brown points out where and how OR is now being used to solve complex business problems.

From Punched Card to Printed Page, page 28, is the story of the Weaver Organization, a lithography firm in Long Island City, N. Y. Typed punched cards are prepared as input for a camera which produces film later used as the actual offset printing master. Error-free, high-speed printing of catalogs, brochures and directories are the end result.

This month's special highlight is a short report on the ninth annual National Machine Accountants Association conference in San Francisco, as well as the Pan Pacific seminars in Honolulu, Hawaii. Of interest is information on Japanese progress in business automation. Page 16.



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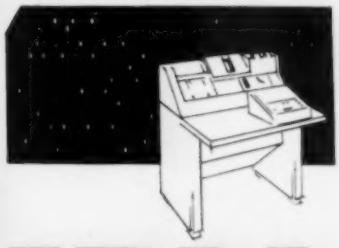

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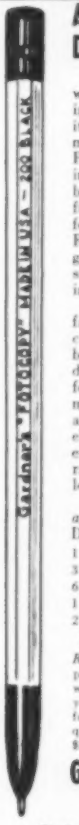

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Use Gardner's FOTOCOPY Pens with your Thermo-fax and other copying machines and enjoy the high quality to which you are entitled, at the most economical prices anywhere. Praised by users for their good starting qualities and fine resistance to bleeding and "gooping," each pen has full 5¾" all brass .039 cartridge — four brilliant colors: Fotoblack (209), Fotored (204), Fotoblue (201), Fotogreen (203)—made with Formulabs® superior quality pre-tested Fotocopy ink.®

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Circle Reader Service Card No. 156

RANDOM ACCESS

Information bits from the Editor's memory file

Costly Data At Dade

In a follow-up to the data processing problems of Dade County, Florida, which started with the departure of the department manager and the discovery that all the procedures were stored in his head, we now find that a consultant has recommended that the computer be returned to the manufacturer. "In ordering new equipment," the consultant, Arnold D. Palley, vice president of John Diebold and Associates Inc., said, "the county has gone a little bit overboard." He recommended that all other new equipment orders by the county be cancelled.

Palley said that the best investment would be the hiring of higher quality, better trained employes. In proposing a revamped budget for the department, he suggested that a $143,000 savings in equipment recommended by his study be used in part to beef up the personnel in the data processing operation.

An Honest Count

A machine that automatically tallies paper ballots has been patented by the Southern California Aircraft Corp. The ballots are fed in, one at a time, and are scanned by photocells. If the electric eyes detect that too many votes have been marked for the offices listed, the ballot is not counted. A special device prevents more than one ballot from being fed in at a time. A pen or pencil may be used to mark the ballot. It is doubtful that many politicians will be enthusiastic about such a meticulous—and honest—vote counter.

End "Dial" Fatigue

Dialing of frequently called numbers will become automatic according to a report concerning a new device patented last week by Bell Telephone Laboratories of New York. With the device, a "magnetic drum repertory dialer," all the subscriber will have to do is turn a knob until the name comes up, and then press a button.

The new device is attached to a desk telephone which can be used by itself in the ordinary way. The repertory consists of as many as fifty names displayed on a strip that rolls on a drum, similar to desk devices used to write down phone numbers. In this case, however, each number is recorded magnetically on tape.

To record a number, the subscriber leaves the handset on the cradle, presses a button marked "record" and dials the number, just as if he were making a call. The number is then ready for automatic use.

Traffic Control

Los Angeles' famed Sunset Boulevard will have computer control over a string of traffic signals. The computer will interpret and act upon impulses it receives from vehicle detecting units placed in the pavement to count the volume of traffic and to determine the major direction flow. Sunset Boulevard was selected as the first installation of this type of control, because a recent survey showed that more than 40,000 motorists use this artery per day, with average speeds during peak hours slowed down to 13 m.p.h.

Strippers making up pages from film shot with RECORDAK LISTOMATIC Camera at John S. Swift Co., Inc. (N.Y.C.), one of the world's largest offset printers

Air France schedules changed yesterday— new ones on press today!

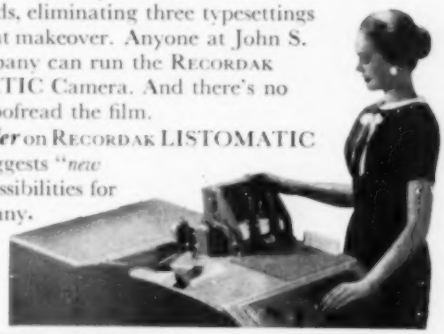
New RECORDAK LISTOMATIC Camera, which photographs information on 230 data processing cards in 1 minute, helps John S. Swift Co. give customers faster, more accurate service in printing schedules, directories and parts lists.

One of the big advantages of RECORDAK LISTOMATIC System is the speed with which numerous and scattered changes can be made at the last minute.

Take Air France schedules, for example. Changing or adding flight information is mainly a matter of typing new cards to replace obsolete ones. And then photographing the deck of cards with a RECORDAK LISTOMATIC Camera. *This ingenious machine automatically adjusts from card to card to photograph one, two or three lines of typing, or 12-, 24-, or 36-point type headings.*

Production costs are much lower—three different Air France schedules are printed from the *same* deck of cards, eliminating three typesettings and constant makeover. Anyone at John S. Swift Company can run the RECORDAK LISTOMATIC Camera. And there's no need to proofread the film.

Free folder on RECORDAK LISTOMATIC Camera suggests "*new business*" possibilities for your company.



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For More Information Circle Reader Service Card No. 157

on the press

"Determining Salaries For Computer Personnel"

Prepared by Philip H. Weber and Company in conjunction with MANAGEMENT and BUSINESS AUTOMATION MAGAZINE.

This report, first of its kind to be published, provides the information necessary to establish a systematic plan of salary administration for computer department positions. Subjects covered include:

Basic Problems in Determining Salaries

Descriptions for Standard Positions

Descriptions for Combined or Mixed Positions

Position Requirements for Rating Purposes

Standard Position Classification Structure

Grades and Ranges for All Positions

Survey Validation of Ranges

Adjustments of Ranges for Area and Company

Classification of Individual Employes into Positions

Effective Administration of Salary Program

Supplementary Data from MBA Computer Survey

To reserve a copy of this comprehensive report for inspection, circle number 120 on the Reader Service Card, facing page 42. Price to MBA readers, $5.00.

from the Publisher's Desk

City Map, Entertainment Guide on Page 3

BUSINESS AUTOMATION

SEMINARS TOP NMAA PROGRAM

DELEGATES at the recent conference of the National Machine Accountants Association in San Francisco were surprised to find a convention newspaper awaiting them at the registration desk. This was a six-page tabloid, generously illustrated, and packed with helpful information . . . a product of MBA's editorial and production staffs.

Among the features presented to the machine accounting pros were highlights of the "Tuesday Tours," for the benefit of those who couldn't get to San Francisco early. Space also was devoted to the seminar program, to the exhibits and to plans for the 1961 conference in Toronto. A very helpful guide to San Francisco proved to be popular with delegates, as did a special feature on the current activities of all the past presidents of NMAA. Also featured was an introduction, in print, of popular Cal Elliott, NMAA's new executive secretary who is already giving a noticeable lift to association ambitions and programs.

This type of "extra" service to the industry doesn't happen by chance. It's the result of a publishing philosophy developed through 56 years of serving other areas of the office equipment industry. We have always recognized the contribution made by the conventions of the worth-while associations in the industry and have sought to encourage their development. Our NMAA newspaper is tangible evidence of this philosophy. We hope it added atmosphere to a very successful conference.

Many delegates took their NMAA supplements home to show to their office associates and, we presume, to their better halves as evidence of their travels. Extra copies are still available in limited supply. If you'd like a free copy, drop us a line.

Charles W. Gilbert

MANAGEMENT and BUSINESS AUTOMATION

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Manager, Marketing Services,
Stanley Roy

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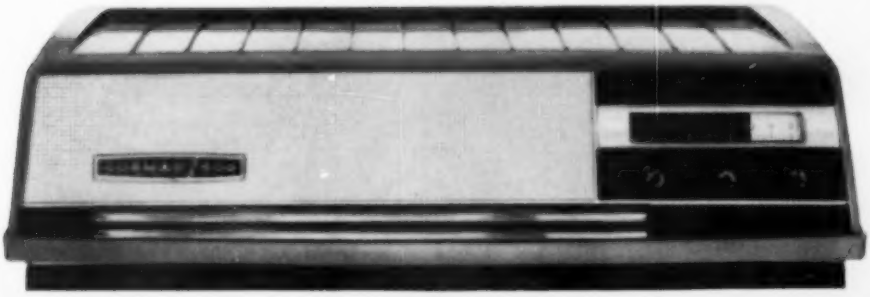
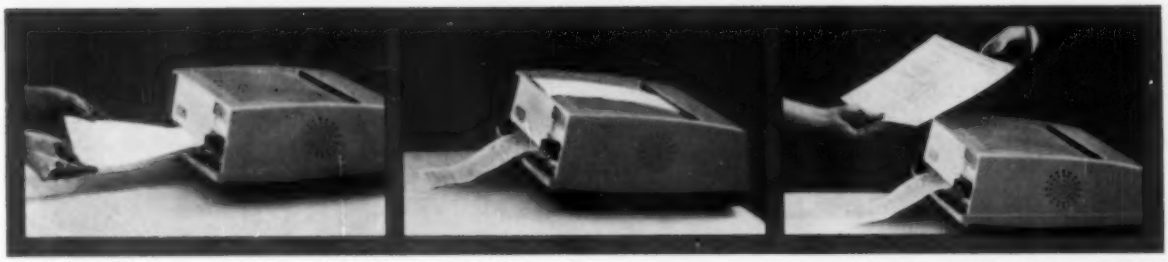


The One-Step CORMAC "500" is an exciting new development in photocopying machines. The result of many years of applied research, it offers new and exclusive advantages that greatly simplify and speed up your office copying work. Here are the features that make it the most efficient, economical and versatile photocopy instrument you can buy.



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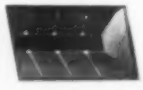

If you've erred, you can "clear"

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Friden

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For More Information Circle Reader Service Card No. 160

Letters

Dear Sir:

I have received MBA from the first issue and praise the editorial content; the advertising presentation is also excellent. The several dollars subscription price is well worth the communication.

Your editorial, "Myth of the Electronic Brain", in June 1960 issue, brought to mind psychological effects on people's thinking while discussing automation, and the integral computer. The computer's challenge to society is directed toward everyday man and his ability to adapt himself to a progressively skilled, technical or creative job.

Keep up the interesting editorials and don't overlook the fact that there may be many readers for a single subscription.

Michael W. Morgan
Armour Research Foundation

Dear Sir:

Except for a place or two where I disagree with William Christian's "brain" work, he has produced an over-all excellent contribution to this unsung area of computer technology—an area where most mathematical and hardware "technicians" in the field seem fearful to tread. Is it possible to get a reprint of the article: "Myth of the Electronic Brain" June 1960?

Thomas A. Kurth
Systems Development Corp.

Dear Sir:

Congratulations on your article on the "Myth of the Electronic Brain" in the June, 1960 issue of MBA. It is an excellent article which should do much to dissipate the errors in popular thinking about the functions and capabilities of computers. I was impressed not only by what you had to say but by the clear way in which you said it.

My only complaint about your article is that it made me feel old, because it contained a picture of, and quote from, Peter H. Greene, whom I taught as a freshman at Amherst College back in 1947. But

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Second, *what weight?* Before you decide, we'll ask you: On what equipment will forms be used? Number of copies? Method of handling? How filed? Pen or pencil writing? For internal or external use, or both? Your answers to these questions help our forms design specialists decide which form paper will be right *and* most economical for you.

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I can't blame you for my getting old!

Again, my congratulations on your very fine article.

Melvin Kranzberg
Editor-in-Chief
Technology and Culture
Case Institute of Technology

Dear Sir:

Thank you for the issue of MBA in which you published your report "Myth of the Electronic Brain."

As you no doubt surmise, I disagree with you in regard to the assumption contained in your title, and I fully believe that within the next 20, 30 or 40 years, the independent capacity of computing machines to "think" will be 99 percent proved.

Edmund C. Berkeley
Editor
Computers and Automation

Dear Sir:

With reference to your June 1960 issue of MBA, the article "First Nation-wide Survey of Computer Department Salaries", your scope and coverage of the problem of evaluation of salary ranges and job classification is certainly to be commended. I cannot help but feel that after a study of your report, many additional companies would be willing and anxious to participate. Should a study of an enlarged scope be undertaken, I also feel the information could be of greater assistance if an additional breakdown by major industries was applied.

T. C. Fisher
Manager of Data Processing
Bell Helicopter Corp.

Dear Sir:

We were shocked to learn that you have seen fit to publish the results of the data processing survey in the June issue of MBA before results were distributed to participants.

Both Messrs. G. J. Fogg and R. E. Dunlap, Thompson Ramo Wooldridge Inc. respondents, requested survey results on a card provided for the purpose.

Moreover, the article is disquieting because a list of "blue chip" participants is mentioned in the report, but no Thompson Ramo Wooldridge Inc. among them.

Will you please mail ten copies of

the results of the survey to me at the earliest possible date.

R. J. Rowe, Director
Salary & Organization
Thompson Divisions

Dear Sir:

Your fine article entitled "The Facts about Facsimile" which appeared in the May 1960 issue of your publication was of deep interest to me as facsimile or "fax", as we generally refer to it, is a vital portion of our business.

It was interesting to note your coverage of the subject and rather disappointing to note that the company which pioneered in the development and engineering of one of the best photo transmission systems was not even mentioned. I refer to Times Facsimile Corp., which dates back to the early 1930's, and its vice president in charge of engineering, Mr. A. G. Cooley, who has spent his lifetime in the designing and furthering of facsimile.

Karl E. Clough
Sales Manager
Times Facsimile Corp.

Ed. Note—Times Facsimile declined our invitation to participate in the facsimile round-up story.

Dear Sir:

The concept following might well reshape many ADPS approaches in the future and should be highly interesting to many of your readers.

We are successfully using a new technique called PCP-Parasitic Computer Programming.

As an extension of the concept of self-programming computers, instead of having a leader card or tape introduced into the system by the computer personnel, we are having such signals placed directly into the tapes or cards by the originating input equipment by fixed wiring.

In practice, NCR Class 31 accounting machines with attached tape recorders are so wired that the tapes themselves contain a configuration of symbols and digits to serve as an address instruction to bring in the correct internally stored computer programming. Customer, application and nature of such information (reference and account numbers versus dollar amounts) are automatically identified for this future processing. No additional operator time or action is required. It saves a great deal of additional clerical work and accompanying possibility of human error on both the part of the input originator and the computer personnel.

It provides the distinct advantage of making possible a 'continuous flow' work pattern for ADP.

I feel it is an important step in truly bringing ADPS to 'Main Street.'

George W. Warner
Accounting Machine Division NCR

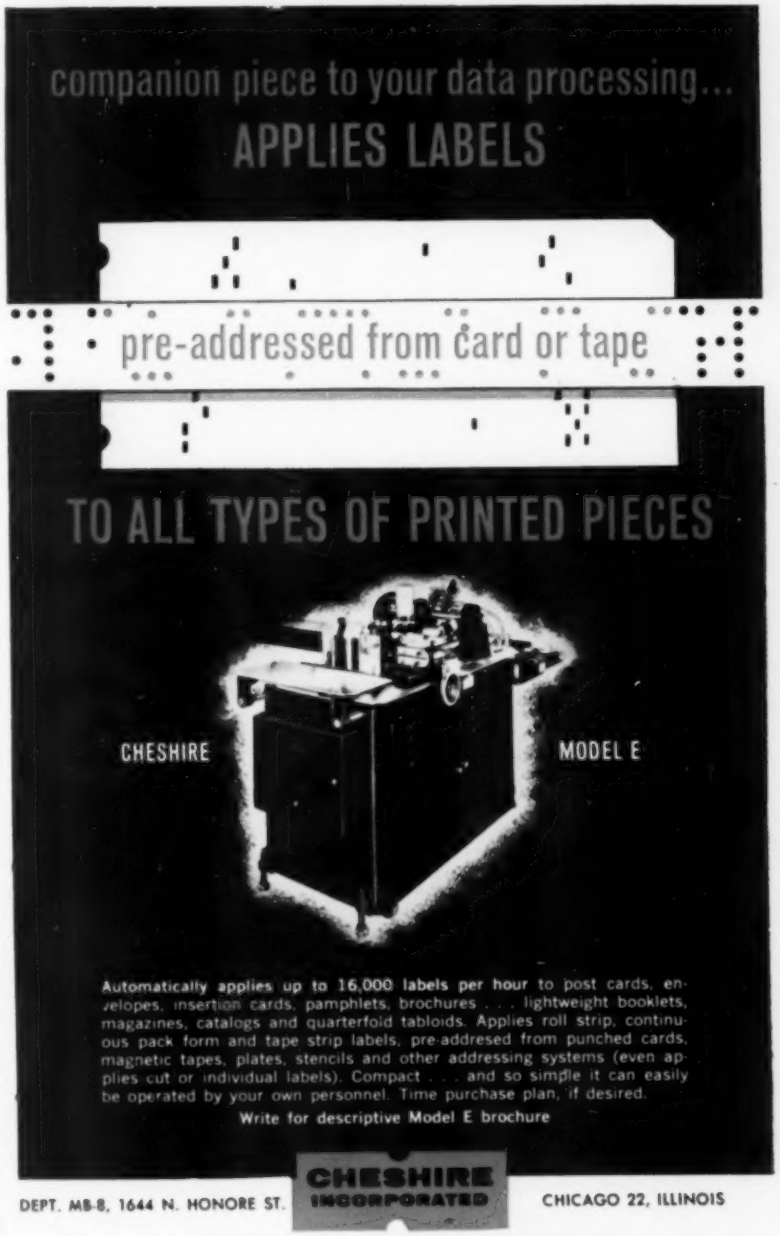
Dear Sir:

The Army Finance Journal published your article "A Case of Missing Management" in its June 1960 issue.

We consider this article a most valuable contribution to the aims and ideals of the Army Finance Association.

The Army Finance Association and I, personally, appreciate your time and effort in preparing the manuscript. We are glad for the opportunity to have published it in the Journal.

Paul A. Mayo
Major General, USA
President AFA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For More Information Circle Reader Service Card No. 163

NMAA Conducts Successful West Coast Conference

Lyman W. Montgomery
The newly elected president of the National Machine Accountants Association is a charter member and the first president of the Shreveport Chapter of NMAA. His business position is section head of methods and data processing for the Interstate Oil Line Co. in Shreveport, La.

NEW OFFICERS, new ideas and new products were features of the ninth annual conference of the National Machine Accountants Association held in San Francisco, June 21 through 24. Some 1,200 registrants were in attendance for the proceedings which this year featured a "Tours for Tuesday" program, giving early arrivals an opportunity to visit various data processing installations in the Golden Gate area.

Highlighting the conference business sessions was the annual election of officers. Lyman W. (Monty) Montgomery of the Interstate Oil Line Co., Shreveport, La., was elected president. He succeeds D. P. Paquin, Kieckhefer Corp., Fond du Lac, Wis. New executive vice president is Wilfred C. Andrews, Bank of California, San Francisco.

Elected as vice presidents-at-large were: Elmer F. Judge, Cessna Aircraft Co., Wichita, Kan. (By-Laws and Credentials); Robert S. Gilmore, Ryan Aeronautical Co., Torrance, Calif. (Chapter Organization and Membership); John L. Brandt, Jr., T.V. Guide, Radnor, Pa. (Conference); John K. Swearingen, General Electric Co., Louisville, Ky. (Education); Donald T. Barber, a management consultant, Toronto, Canada (Library and Publications); Alfonso G. Pia, Church of the Latter Day Saints, Salt Lake City, Utah (Publicity and Awards); and A. A. Ziegler, Caterpillar Tractor Co., Aurora, Ill. (Research and Advisory). Re-elected as treasurer was Clyde DuVall, Peoples Gas Co., Chicago.

Bernard R. Purslow, Ontario Hospital Service Commission, Toronto, Canada, was elected vice president of the 1961 conference, to be held in that city.

Conference activities shifted frequently between the Fairmont and Mark Hopkins Hotels, the Masonic Memorial Building and Brooks Hall. The latter, a huge underground garage, was converted into a cavernous banquet hall for the presidential reception and banquet.

Carrying out the conference theme of "management-methods-machines," the three-day meeting featured a full schedule of speeches and seminars covering a wide range of business automation problems and applications.

In the keynote address, John S. Woodbridge, controller, Pan American Airways, speaking on the subject "The Human Factor in Business Electronics" stressed the need of new approaches to data processing so that industry could be relieved

One of the new ideas of the conference was a "Tours for Tuesday" program of visits to data processing installations in the San Francisco area. Here is a group at the S & W Fine Foods Inc. office.

An "Aloha Welcome" was in store for the 74 NMAA conferees who jetted to the nation's youngest state—Hawaii. Here they attended the Pan-Pacific Seminars program in Honolulu and enjoyed the beauty and entertainment of Oahu Island.

of the "avalanche" of punched cards now necessary to process business records.

The seminar program covered applications, equipment, management, and general education. Industry forums gave conferees the opportunity to discuss problems and solutions peculiar to specific industries, while a new innovation, the Hall of Discussion, provided a forum for an informal discussion of any topic of interest pertaining to data processing. The exhibit area displayed the latest in equipment, accessories and publications from 24 of the industry leaders.

At the final business session the national directors voted for New Orleans as the site of the 1964 conference. Philadelphia, Dallas, Miami and Los Angeles had also bid for the '64 meeting. New York will be the scene of the 1962 conference while Detroit will host the 1963 meeting.

The conference registration grand prize, an "Electronic Portfolio" of stocks valued at about $1,000 was awarded by drawing to Harry E. Carlfon, Birmingham, Mich., during the closing ceremonies.

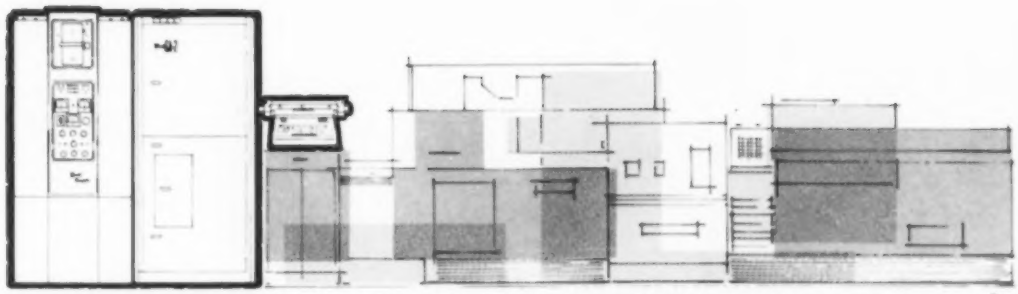
From San Francisco 74 of the conferees continued by jet plane to Hawaii for the Pan-Pacific Seminars which were held at the Sheraton Convention Meeting House in Honolulu, starting June 27. Hosts for the meeting was the Honolulu NMAA chapter. Donald A. Swan, Uarco, Inc., San Franciso, was director of the seminar program.

Highlight of the Honolulu sessions was "An Asian Computer Report" by Kaoru Ando, managing director of marketing and services for IBM, Japan, Ltd. Mr. Ando pointed out that two Japanese component developments, the Esaki diode and the Goto parametron, were playing a significant role in the solid state computer industry, both in Japan and in America.

According to Ando, both of these items have proved superior to those previously used in solid state computer construction. Japan has around 150 computer installations; 94 in the "small" category, 45 medium-scale, and 13 of the large-scale type.

The majority of these computers are imported products, he explained, but the Japanese manufacturers are making tremendous strides in the development of new computer systems.

So far they have produced six different systems; The Hitachi Co.'s "Hipac" and "Hitac," Toshiba Electric's "Tobac" and "Tosbac," Nippon Electric's "NEAC" and Fusi Electric's "FACOM." Ando also called attention to the development of a new chain printer by the Oki Electric Co. A printer, he said, felt to be superior to that now used by American computer makers. While the Japanese computer manufacturers are subsidised by the government for developmental purposes, Ando said that he knew of no plans to introduce these products in other countries. ■



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For More Information Circle Reader Service Card No. 164

Computer systems makes updating of vital mobilization records a reality and offers an estimated saving of $278,500 in costs.

The Air Force Automates Its 'Manpower Bank'

By D. M. Parnell, Jr.

PASSING a magnetic tape master file through a computer system in a few short hours will produce a mobilization alignment of 535,000 airmen who make up the United States Air Force "manpower bank." With the system in operation, the Air Force can — with pinpoint accuracy — quickly identify reservists who have the qualifications to fill assignments in various mobilization positions deemed critical to national defense.

The living record of the service, skills, capabilities and availability of 134,609 officers and 400,993 airmen not on active duty is now being maintained by an RCA 501 electronic data processing system at the Air Reserve Record Center in Denver, Colo. With its speed and accuracy, the system has placed a statistical, filing and editing operation of monumental proportions on a daily current basis, automating the vital flow of statistics through one of the world's largest personnel centers. The ARRC now has the capability of handling a steadily increasing work load without the need for increasing its manpower, and there is every indication after nine months of operation that an estimated annual cost savings of approximately $278,500 will be realized.

The center promotes, assigns, retires, separates and discharges more than 219,000 reservists a year, and each of these actions must be recorded in their individual files as well as in updated strength and availability reports required periodically by Headquarters USAF, the Continental Air Command, Department of Defense and members of Congress.

With the computer and tape system, documents that would stretch six miles, end to end, are now stored on 10 reels of magnetic tape. It is also possible for the center to process an average four million pieces of correspondence a year, pertaining to the status of individual reservists, at a rate of 17 minutes per 1,000 inquiries—as compared to 367 manhours needed previously.

Approximately 100,000 personnel record file changes are processed weekly, including "audits" for compatibility of each reservist's qualifications and status with his assignment. The EDP system is also used to identify individuals who are to receive periodic personnel survey forms used in maintenance of Air Force Reserve mobilization potential; to address the forms and control surveys, and to make any necessary follow-up in the mailing procedure.

Prepares the list of eligibles

In the annual assessment of officers for promotion, the computer selects and prepares the list of eligibles for consideration by grade breakdown; and, if favorably passed upon by the review board, enters the promotion on each officer's magnetic tape record file.

In addition to these record keeping tasks, the system prepares labels for mailing 330,000 copies monthly of the Air Reservist Magazine and 20,000 copies quarterly of the Medical Training Bulletin. The computer also handles queries from such agencies as the Veterans Administration on a same-day basis, heretofore an impossible job.

The consideration of automation for the com-

plex activities of the ARRC followed shortly after it was opened in 1954. Previous to this date, records were held in eight scattered locations throughout the country. When the records were brought together, it was found that center personnel was maintaining some 240,000 records in a file bank of punched cards. This number grew to 432,357 by the beginning of 1958, and new records were arriving at the rate of 18,000 per month. This meant the center workload would be doubled without the benefit of additional personnel. The growing importance of keeping the records up to date made it imperative to consider automation.

A comprehensive feasibility study established that it would be possible for ARRC to: (1) Maintain reserve records on a current basis, (2) Reduce the over-all cost of the ARRC operation, and (3) Provide services which were not being furnished.

Total systems approach

Six manufacturers made proposals, and after a careful study and analysis of the various systems, the RCA 501 system was selected. The installation was completed in November of last year, 18 months after planning began.

The system selected includes eight tape stations on-line, two modules (33,000 characters) of high-speed memory, a card transcriber, a transcribing card punch, and an off-line high-speed printer. It will accept information from either punched cards or punched paper tape. The punched paper tape is being created on Underwood "Data Flo" units which also produce hard copy information.

ARRC studies showed that the input to the computer was a very significant consideration. To develop an "integrated total system" approach, entire procedures were analyzed from data origination through complete processing. The examination revealed that the center prepares over one-third of the total orders affecting Air Force reservists. Using the total systems approach, it was proven that creating a punched paper tape for computer input at the same time an order was prepared would eliminate the attendant danger of further transcription errors at any of the processing points. The paper tape reader used in connection with the system operates at speeds of 1,000 characters per second.

The first real challenge to the ARRC in the conversion program was in creating a magnetic tape master file from punched cards. The limitations of the punched card equipment in use underscored the need for development of strict audits during the process of converting these cards. To add to the problem, all data pertaining to reservists was not available on a single card.

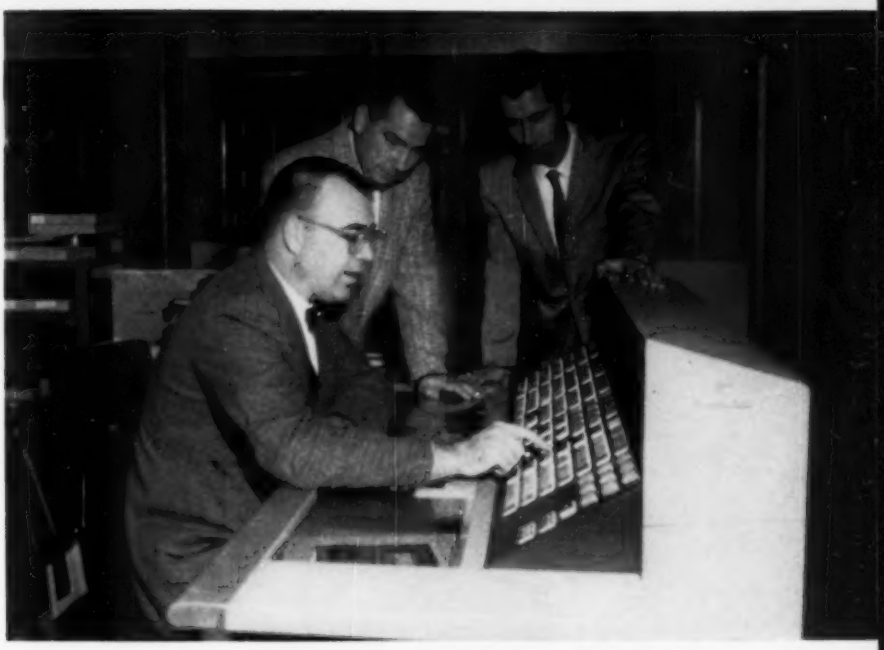
There were, at the time, four basic cards on file for each reserve officer: classification card No. 1, containing the basic personnel data; classification card No. 2, containing reserve promotion data; an address card (or cards), and finally a special card which was created as a result of a recent audit.

The first step of the EDP program consisted of converting each card deck to magnetic tape and performing an audit to identify duplicate cards, errors in format and the like. The next step, and probably the most important one, was the merg-

About The Author

Mr. Parnell is the Civilian Deputy to the Commander of the Air Reserve Records Center. He has served in this capacity since 1957, and was active in the evaluation and selection of the large scale electronic data processing system. He has also served as chief of the Management Office of the ARRC and chief of the Statistical and Analysis Division in the controller's office in the Air Force Finance Center.

Massive personnel files of 535,000 Reservists are stored on 10 reels of magnetic tape such as the one being inspected by Brig. Gen. J. M. Chappel, Commander of the ARRC.



Programming for the ARRC system was in the hands of Kenneth H. Western, seated, chief of the Program Development Branch; Kenneth Agnew, programmer, and Jim Bode, RCA Tech representative.

ing of the four tapes to create the master file on magnetic tape. During this computer operation, a check was made to identify missing cards by specific reservists and to prepare rosters for research to obtain the missing data.

At this point the check was only for missing cards with no reference to specific items. The data passing the audit was merged and arranged in the format of the center's permanent master file sequence. This was the beginning of the system.

No 20-year-old colonels

The next check was instituted for an audit of the master file against criteria to assure that it contained specific data and to validate compatibility of this data. In addition to the obvious audit for missing items, the compatibility check was made in various areas such as rated Air Force Specialty Code vs. Not On Flying Status or Year of Birth vs. Current Grade. For example, it would be an obvious error if a reserve officer born in 1940 should have attained the grade of Colonel in the Air Force Reserve.

Updating the master file is accomplished in three computer runs. The first run gets the input into computer format and audits for completeness or to eliminate erroneous information. The second run is designed to audit, prior to updating of the master tape, all transactions for accuracy of formats (including dates and items with the transaction, correctness of the new information, and logical reassignment. The third run is the actual updating of the file, matching transactions with reference messages according to the transaction code. The reference message is either changed, deleted from the file or written out as being incompatible. This is also the point where gains to the file are permitted.

Provisions have been made for simultaneous extraction of information from the master file according to predetermined criteria at the same time as updating and processing. For example, the monthly extract of those reservists who are to receive the Reservist magazine. The outputs from this one run are an updated master file, extracts for further computer operations and information for reporting purposes.

There are approximately 100,000 of these record file changes processed every week. All errors are printed on the off-line printer for use by a research group.

With the master file on an updated basis, the ARRC has a clear path for its functional assignments. Inquiries, for example, can be processed on a same-day basis. These come from Government agencies as well as from outside sources. The VA may be seeking information on a reservist leaving active duty and desiring to buy a home. The necessary facts are forwarded quickly to facilitate the VA loan.

In line with the all-important mobilization alignment, the center has the responsibility of

Continued on Page 36

AMA
OFFICE MGMT
FORUM

An AMA forum from planning stage to conclusion is followed by MBA to give readers an inside look at the organization in action.

Teaching Management How to Manage

AN OPERATING EXECUTIVE, faced with a growing and critical paperwork problem, knows he must develop an effective management information system to facilitate decision-making for his company. He is confronted with an increasing number of new techniques, developed to help him solve his problem, but he lacks personal contact with the techniques and the men who have used them. He needs more information to make an intelligent choice for his firm.

It was for this man that the American Management Association presented its recent forum on "Advances in Management Information and Reporting." For AMA, the forum was a part of the complex and challenging job of teaching American management how to manage.

Such workshop sessions for businessmen represent the AMA's major goal, to present an up-to-the-minute briefing on new developments in a selected field—or knowledge in-depth of specific management jobs and responsibilities.

AMA's philosophy has been summed up simply in a 14-word statement: "Management is the theme, experience is the textbook, and members learn from each other." The 37-year-old, nonprofit, educational organization, now comprising more than 29,000 members, provides training, research, publications and information services for thousands of management people every year. The strength of its successful programs has been credited to the fact that operating executives serve as both "faculty" and "students" at the meetings and seminars.

In the words of Gabriel N. Stilian, manager of the AMA's Administrative Services Division, the "Advances in Management . . ." forum would "afford executives a penetrating look into the various relationships in gathering and assimilating information, preparing it for electronic data processing and using it in reporting information to management for decision-making action."

According to Mr. Stilian, there has been too much emphasis placed on "traditional" accounting-type controls and not nearly enough on the establishment of routine information flows for data in these four areas: long-range planning, capital formation, new product strategy and simulation for pre-testing proposed lines of action.

The idea formulated by the AMA was to offer concrete, practical help both to the practitioners in the field and to operating executives in general.

MANAGEMENT AND BUSINESS AUTOMATION saw the forum on information reporting as a vital topic in a critical area. In evident agreement were over 100-top-echelon management men from all sections of the country and from all segments of commerce and industry. They found the stated objective of the session an enticement they could not afford to pass by.

With the objective determined, AMA's Administrative Services Division, sponsor of the semi-

C. A. Phillips, Office of the Assistant Secretary of Defense: ". . . the entire information processing community should be grateful for this new program."

Dr. Samuel Alexander, Nat'l Bureau of Standards: ". . . there is much to be learned by a discussion of the 'cloudy hours' as well as of the 'sunshiny hours'."

Ronald Daniel, associate, McKinsey & Co., Inc.; "The goal was to bring together specialists and to focus their thinking on management information systems."

Dr. Herman Limberg, Office of the Mayor of New York: "The meeting was a significant milestone in identifying management's needs for information."

nar, set out to arrange an informative and challenging meeting. As is typically the case, the arrangements were divided into three phases:

First, in conjunction with the particular meeting chairman, the division sought and invited the participation of the leaders in the field. Usually these are found in the organizations which enjoy the greatest successes in the field under consideration. In this case they were systems and procedures men from government and industry, educators, consultants and specialists, all of whom have been exposed to the transmission of information to management by using electronic data processing equipment.

Second, the division's Planning Council—consisting of 25 operating executives in the various areas of office management and headed by a division vice president—contacted these leaders and began discussing, with the division manager, discernible patterns in the management information field, the problems facing the average company and its practicable solutions.

A communications "vacuum"

The third step was to narrow the subject matter down to specific topics and to select and define the format of their presentation. Suggestions were then passed on to the appointed discussion leaders who would conduct the seminar. In addition to the practical knowledge of their field, the leaders did research from supplementary information.

At this point, the division was ready to line up the meeting place, schedule the speakers and prepare announcement brochures.

In an area as complex and broad as management information and reporting, much groundwork had to be laid by the AMA before it could offer such a share-the-knowledge laboratory as was held in May. As Mr. Stilian stated: "In industry today, operating executives are called upon to effectively direct the activities of their functions, but have not been put into the position of being able to receive the data they need to make decisions based on precise and timely information."

Consequently, he continued, many company operations, from the lack of adequate communications, have been handled in a "non-scientific" manner. To correct this communications "vacuum," he said, the AMA decided to take action and create the new seminar "to assist business organizations develop the people who will design the information systems that will meet company goals."

Conferees attending the three-day meeting, May 9-11, in New York City, came to listen, to learn and to share—and they meant business. Assembling in a large suite in the Hotel Biltmore, or sitting in on smaller groups at round conference tables during intermissions between lectures,

members showed interest at formal sessions and highlighted group discussions with active interchanges of comment.

Lectures included the relating of case-history information on specific management information installations in some of the largest American companies. Examples of areas under discussion were "A Fundamental Approach to the Design of an Integrated Management Information and Reporting System" and "A Practical Means of Effectively Achieving the Integration of Business Systems Techniques."

A happy innovation

Richard F. Neuschel, director of McKinsey & Co., Inc., New York City, and keynote speaker at the meeting, summarized the importance of EDP data by saying: "There is no question that electronic and punched card equipment can produce more information faster than can be generated by other means. Because this is true, however, one wonders if our ability to generate information has not far outstripped our ability to assimilate it and use it intelligently in the running of the business. In any event, all levels of management face the persistent danger of becoming so fascinated by the lure of office automation that they lose sight of a far greater need to sharpen their skills in determining what information is of real worth."

If enthusiastic approval by its participants is the test for determining the success of a seminar, then the "Advances in Management Information and Reporting Systems" meeting must be counted among the AMA's happiest innovations in recent years. Comments from participants on the basis for the meeting and on the results leave little doubt that much help was gained.

next month . . .

Optical Scanning

Highlighting equipment and applications, this comprehensive roundup will answer many questions about the newest devices for automatic character recognition.

•

The Government and ADP

The biggest user of equipment and systems has initiated a task force attack on the biggest problems of data processing.

Meeting chairman James D. Gallagher, assistant director of systems planning, Lockheed Aircraft Corp., Burbank, Calif., stated that: "The basic reason behind development of this meeting was to bring together the various disciplines and functions that have been employed on an individual basis in the development of management reporting systems. We wanted to emphasize and underscore the requirements for recognizing the inter-relationships of such specialties as operations research, systems planning, communications, et al, and how they can be employed in organizing a meaningful, effective management information system."

To this comment co-chairman Ronald Daniel, associate, McKinsey & Co., Inc., added: "The goal was to bring together specialists and to focus their thinking on management information systems and their inter-relationships, disciplines and other rules. Such a meeting can help to expand the approach to such systems, particularly in pointing up the ways one goes about developing such a system from all angles."

Carl L. Byham, assistant to the controller, Southern Railway System, Washington, D. C., said: "The concept of a broad-scale information processing system is very important today in business planning. Probably every large business—certainly every one using EDP equipment — is working toward this ultimate goal. AMA can perform an important function by focusing attention on the many aspects of such an information system and emphasizing the role of management in its development."

A sensitive and timely subject

The effect of the meeting was capsuled by Dr. Herman Limberg, senior management consultant, Division of Administration, Office of the Mayor of the City of New York, who said: "The meeting was a significant milestone in identifying and defining management's needs for information in making effective decisions. The meeting was competently conducted, the speakers' comments were excellent and the interest evinced by the participants indicated that the forum touched on a very sensitive and timely subject."

According to K. A. Foster, supervisor of data processing applications, Sylvania Electric Products, Inc., Camillus, N. Y., two factors have accounted for the "extensive interest" in management information systems and made necessary seminar study of their potential. These are, he said, the desire of management to reduce the sheer volume of unrelated reports, and the capacity of computers to relate data.

Along the same lines, Charles A. Phillips, direc-

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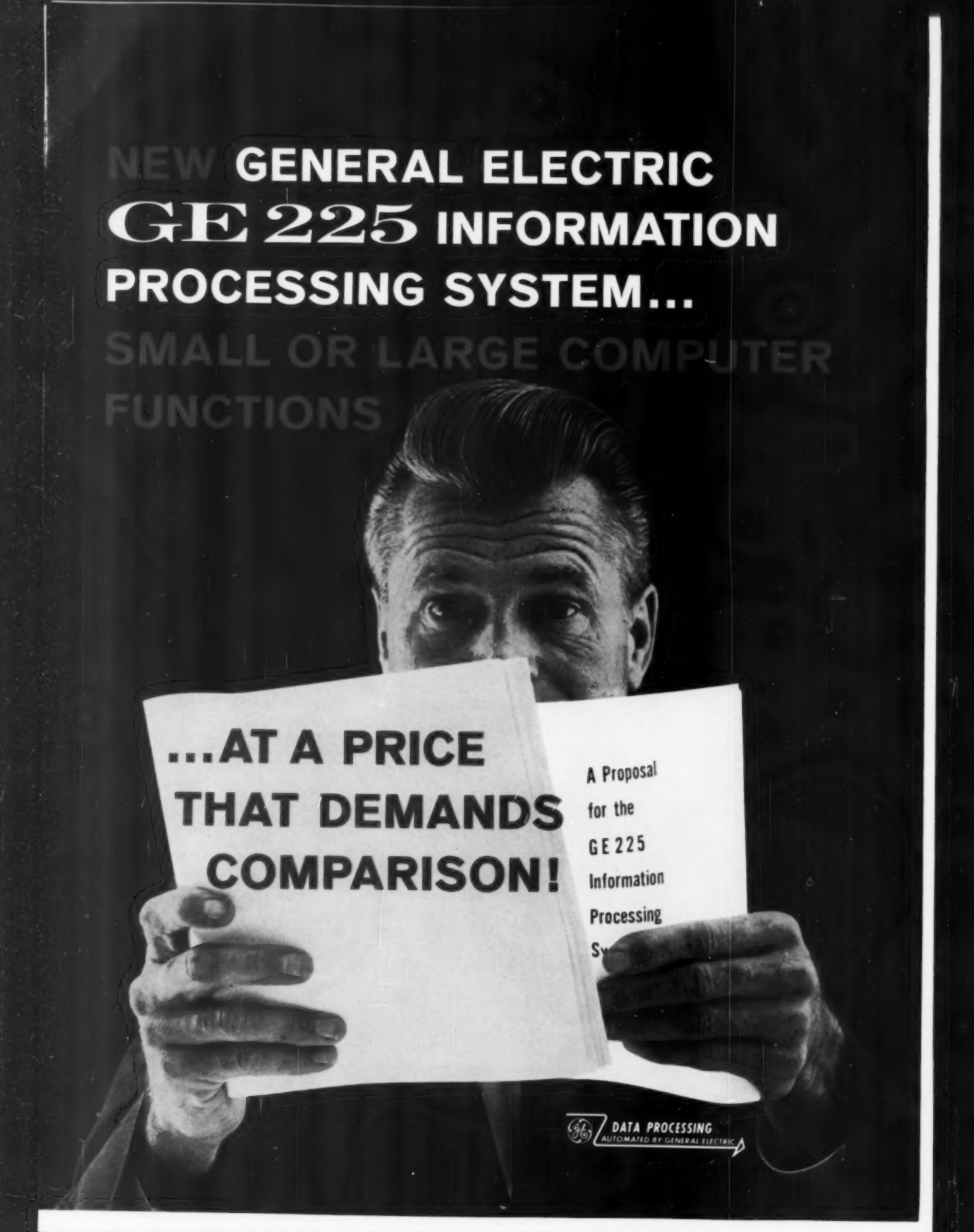
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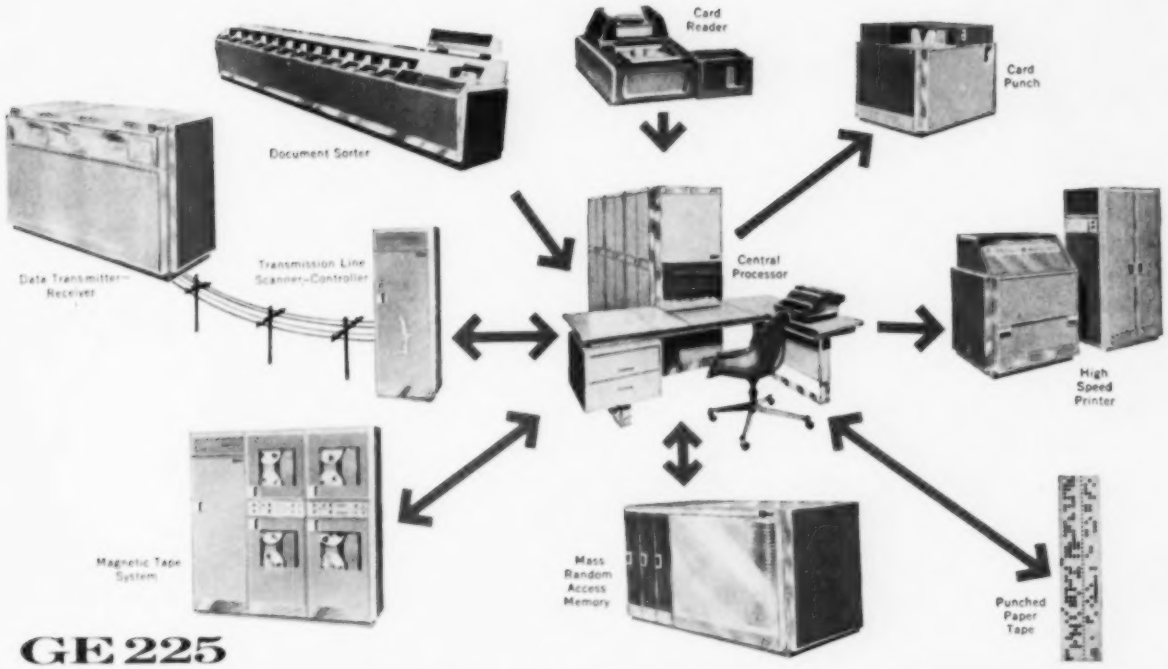

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• Optional built-in floating point saves operator and programming time.

• Versatility makes system practical for use and planned growth in smaller firms where computer operation has heretofore been unfeasible.

• Full range of services—programming aids package, General Compiler, General Assembly Program, training and consultation, back-up computer centers, and maintenance program—assures peak efficiency.

For more detailed information, write today for brochure CPB-101 on the new GE 225 Information Processing System. Also available: brochure CPB-81 on the GE 210 Data Processing System.

Write to: General Electric Company • Computer Department • 13430 North Black Canyon Highway • Phoenix, Arizona.

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General Electric—A pioneer in computer systems for all phases of business, industrial, scientific, engineering, and financial endeavor.

For More Information Circle Reader Service Card No. 165

The Foto-List system can convert data on cards to rolls of film at speeds up to 7,200 cards an hour.

Weaver's compact, modern composing room is more like a business office.

From Punched Card to Printed Page

PRODUCTION time has been cut in half and the chance for errors eliminated in the printing of brochures, manuals, directories and catalogs by the Weaver Organization in Long Island City, N. Y. A punched card, containing a single line of typed copy, serves as the media for processing source information directly into print.

The 12-year-old commercial lithography and printing firm was the first of its kind to make use of the Foto-List system developed and marketed by Vari-Typer Corp., a subsidiary of Addressograph-Multigraph Corp. The system has been in operation for over a year, and, according to owner Malcolm Klein, it is now an integral part of the company's basic production program.

The Foto-List unit accepts publication data recorded on the file cards by Vari-Typer Model 610 line composers or a Vari-Typer Model 800 automatic photo-composition machine for setting larger display type. The company has six of the 610's and one 800 to handle the volume of material being printed. Beside brochures and manuals, The Weaver Organization prepares lengthy publications such as the membership rosters of the Society of Automotive Engineers and the Society of Plastic Engineers, the Cooper Union (N. Y.) Alumni Directory, Sweet's Catalog Service and a listing of titles available from the Hawthorn Books Division of Prentiss-Hall, Inc.

The typed cards are filed according to classification for the job at hand (alphabetical, numerical, model, assembly unit) and housed in metal trays. They need to be proofread only once, no matter the number of separate publications they may constitute, since their conversion into print is completely photographic.

A major advantage in using cards, Mr. Klein pointed out, is that late insertions, deletions or other corrections can be made at any time prior to feeding them into the Foto-List machine. They can also be stored in a much smaller area (a file cabinet) than required to store metal type galleys, and they can be housed within easy access of the personnel who need them for reference or in-

Copy for catalogs, brochures and directories is set on punched cards by these Vari-Typer line composers.

terpolation into additional publication projects.

It would be even possible to code-punch the cards for electronic sorting, if the information was required for use in more than one publication. For example, if parts data were being recorded, and the parts are used in more than one model of machine, sorting could reconstitute the information to apply to all models or sub-assemblies involved.

When the cards are ready to be photographed, they are removed from the trays and loaded into the Foto-List's feeding mechanism. A push of a button activates the cards which sweep past the camera lens at a rate of 7,200 an hour. Each line of data is recorded on a synchronized roll of negative film, becoming a column of sequential and perfectly aligned reading matter.

The alignment is achieved by pre-punching the cards with a single hole at each end. During the typing operation on the line composers, pin grippers pass through these holes and hold the cards securely while they are being typed. This means that every line is typed in the same position on every card. A set of pin grippers in the Foto-List repeats this process, holding the cards in place when they reach the camera lens. This assures proper spacing between each item line and alignment of margins.

The negatives require little or no opaquing in the printing process, and space can be reserved (by using blank cards) for illustrations, graphs or diagrams. After the cards have been run through the machine, they are returned to the files in original order, ready to be used again.

Final step in the system is the printing of the material in whatever form is required. The negatives can be combined to form several columns on a page or stripped into any desired page form.

Prior to the installation of the system, Mr. Klein said, the reproduction of the file data into metal type was a costly and time-consuming operation. At publication time, lists of names, machine specifications and other catalog-directory items which comprised the final printed edition, were passed on to a typesetter. After the type was set, two sets of proofs—the original and the corrected set—were returned for checking purposes. When the final corrections were made, the metal type was placed into page forms and printed.

Typesetting and makeup problems have been eliminated with the new system since the file cards take the place of the metal type and a counting device on the Foto-List machine automatically allots the number of lines to a page.

The comparative low cost of preparing the negatives for printing makes it economically possible for the Weaver Organization to produce short runs of the finished printed job.

This, and other time and cost saving advantages, can be translated into two meaningful terms —quick service and customer satisfaction. ■

Operations Research— What, Why, Where and How

By R. Hunt Brown

The majority of articles written about operations research are in the language of the professors, scientists and engineers who understand the mathematics, principles and computers needed to solve the problems. The result is that many executives find it difficult to grasp the fundamentals of this valuable form of scientific management. Here, Mr. Brown sets down the basic precepts of OR in business language.

About The Author

R. Hunt Brown is president of Automation Consultants, Inc. and Automation Publishers, Inc. He is well known as an author and as a lecturer on office automation, and his 30 years of global consulting experience in automating data transmission and business systems qualifies him as an authority in the field. Mr. Brown and his associates have participated in electronic feasibility surveys concerning manufacturing, airlines and railroad reservations, commercial and savings banks, retailing and distribution, public utilities, cost reduction surveys, government and other data processing applications.

OPERATIONS RESEARCH, in plain words, is simply the application of scientific methods in the solution of ordinary business problems in order to enable management to base decisions on facts rather than on intuition.

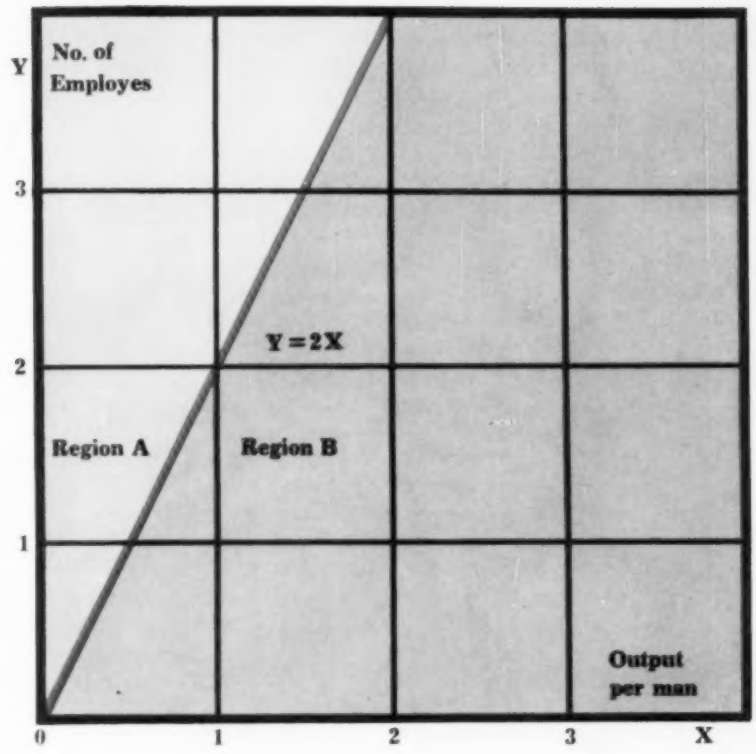
Its origin is obscure, perhaps insurance actuaries or economic statisticians with their complicated formulae, aided only by pencil, paper and logarithm tables, produced the first business forecasts.

The earliest recorded large-scale use of modern OR techniques, like many firsts, was made by the Bell Telephone Laboratories. In the 1920's, Walter Shenhart applied the theories of probability and statistics to the problems of sampling and quality control. Industrial engineers, market research analysts, cost accounts and telecommunications growth-pattern forecasters all subsequently contributed to the advancement of this new science.

No real father

There was, however, no real father of operations research. World War II was undoubtedly responsible for the advent of the first OR teams, and this is where the term OR originated. These teams were composed of American and British scientists, who made studies of military logistics for the purpose of providing allied leaders with factual and quantitative data so they could make decisions in such problems as: What is the optimum height for a bombing run? (taking into account past experience with hits and misses, capabilities of various types of aircraft and numerous other variables) ; or, what is the optimum deployment of ship convoys to minimize losses from enemy submarine warfare? The unqualified success of various OR teams in warfare led to the development of new OR techniques which included linear programming, Monte Carlo, queuing, sampling and probability.

The applications of OR by companies on their



The linear programming technique of operations research is illustrated by this simple graph. By translating the number of employes required to do a particular job (y) and the number of units produced (x) into the equation y=2x, this invariable information, presented visually, forms the heavy straight line shown on the graph. Following the progression, management can make decisions on increasing personnel or production based on the information on this chart.

own computers are legion, but most of them have not had much publicity for reasons of company policy. It is safe to say that everybody and his brother is considering OR in some form.

One of the most common problems of modern big business applies to manufacturing-distributing organizations. What is the optimum location of factories, warehouses and sales offices to operate at a minimum of expense? As early as 1955 two such problems had been run successfully on the IBM 701. One was by Rayco (manufacturer of automobile seat covers and accessories), with a formula for 37 variables to determine optimum locations of sales offices, and also the forecasting of sales predictions. Another was by Shell Oil in minimizing transportation costs from four storage points to 51 destinations—after formulating the problem and programming the computer, the answer was automatically printed out for 260,000 stock items in 10 minutes.

The best known technique in use is linear programming, an OR method which permits the determination of the best use of the facilities available to an organization. It is a computational method which tests, accepts or rejects various possible combinations of a quantity or factors to ascertain the best combination. Whenever the element of uncertainty is reasonably small, and where the relationship between the factors can be expressed with some degree of accuracy, then linear programming is commercially practicable.

An optimum solution to such a problem cannot be 100 percent accurate, but an answer which is based on all known facts with reasonable assumptions as to the variations is considerably better than a guess.

Stated concisely, linear programming is merely an OR technique for determining the best allocation of limited resources to accomplish specific objectives. Mathematics cannot be considered an exact science in all aspects, as much of it is based on questionable assumptions of the ancient Greeks (like Euclidean geometry), but it is far more exact than the processes of the fallable human mind.

A straight-line relationship

The term "linear" simply means a straight-line relationship. Many mathematical equations can be expressed by lines on a graph—linear (straight) or non-linear (broken or curved). The simplest form of linear program is a straight line algebraic equation such as $y = 2x$. (See graph.) This could be a special case of the "Simplex Technique."

This technique is applicable to problems requiring optimization of a linear relationship subject to certain restrictions on the factors involved.

Any point which lies on the heavy line or slope, represents a solution of the above mentioned equation. On the chart the Regions A and B to the left and right of this line respectively represent inequations. An inequation has significance in linear programming—it means that y is greater than 2x for Region A, and that y is less than 2x in Region B. In other words, if y equals the number of employes on a job, and x the output per man, one man can produce half a unit of work. Therefore if management wishes to know how much production will increase with more personnel, or if he wishes to know how many people it will require to produce a certain amount of goods, he can determine this by simply looking at the graph. He will see not only one but several possibilities on which to base his decision. This particular example is very elementary; most problems are very complex and must be worked with a greater number of variables. Linear programming applies to a set of linear relationships among a number of factors which may include both constants and variables. The equations are usually shown on a graph or matrix where results are seen simultaneously, rather than figured by simple algebra. This means if the first result is not feasible for a decision, because some element is missing, the first available choice is shown on the chart without extensive computation.

Linear programming is applicable in the areas of planning and scheduling, such as production control in a factory. It may also be used in areas like transportation problems, make or buy ananlyses, warehousing control, inventory management, sales forecasting, job evaluation, where to buy, where to sell, where to produce, production blending, machine time and manpower allocation.

Transportation, for example, was one of the first areas of application for the technique. The object of an OR study here is to minimize shipping costs of a standard product like a can of paint, between a number of factories of a company to a number of warehouses. Various factors are involved, such as transportation and storage rates, cost of production at each factory and delivery commitments to retailers. These factors can all be expressed mathematically, so that an OR model in mathematics can be constructed for computer solution.

"Damn it, Farnsworth, you make the next decision—I'm bushed!"

Too early to judge

Purchasing is another fertile area for linear programming. Suppose it is desired to obtain a given quantity of widgets (which are similar in quality specification to simplify the problem), from a number of suppliers located in different geographical locations. Let us assume that these widgets are of different sizes, and that with a given manufacturer there is a certain limit to his production. Where to buy what quantity of each size from which particular producer, in order to minimize the total cost of procurement, are questions best solved by linear programming when a multiplicity of factors (of both constant and variable nature) are involved.

A survey by the American Management Association in 1958 unearthed some interesting facts about who was using operations research at that time. The questionnaire was sent to 5,325 individuals, representing 3,150 organizations in the United States and Canada, most of which were industrial firms. An analysis of replies from 720 individuals of 631 companies, showed the following: (1) Over 50%, or 325 companies, reported that they were using OR; (2) Of the 307 companies not using OR, 144 said that they were considering doing so; (3) There were 288 companies which offered evaluations of their OR programs—55 of them reported appreciable savings, 75 claimed improvement of results and 168 felt it was too early to judge the benefits. There were 17 firms asserting annual savings of $100,000, five over $1,000,000 and two saved over $2,000,000.

As a particular example of OR profitably employed, here is a study of a transportation problem solved by linear programming at the Maxwell House Division of General Foods Corp. In this case the mathematical model (series of equations

Continued on page 38

James D. Gallagher, Lockheed Aircraft Corp. and meeting chairman: "The basic reason behind this meeting was to bring together the various disciplines and functions that have been employed on an individual basis."

Teaching Management

Continued from page 25

tor of the Data Systems Research Staff, Office of the Assistant Secretary of Defense, Washington, D. C., commented: "A meeting which brings together information on actual experience, along with concepts of new techniques, on management information systems should be of tremendous value to those companies or government agencies seeking improved management. AMA is in a unique position to conduct this type of meeting, and the entire information processing community should be grateful for this new program."

Learn from "cloudy hours"

In the opinion of Norman J. Ream, director of systems planning at Lockheed Aircraft, "there has been to date no concentrated effort on the part of industrial, university, or management professional groups to carry out intensive and extensive research on the problems of management. Until this is accomplished, we will continue to walk on the fringes of the problem. We have all learned from this forum, but to me the one thing we should have really learned is that no one has the answer to the problem of integrating management."

The feeling of some conferees that the meeting should have included case-history reports of failures, as well as of successes, in the management information area was summarized in a statement by Dr. Samuel N. Alexander, chief of the Data Processing Systems Division, National Bureau of Standards, Washington, D. C. "In the areas where a steady flow of successes is the normal order of the day," he said, "the presentations at such meetings as this one represent a valuable communication service. However, this tends to be characteristic of mature and relatively stable fields. On the other hand, in rapidly changing fields—such as the one this meeting covered—there is as much to be learned by a discussion of the 'cloudy hours' as well as of the 'sunshiny hours' of the case."

The Administrative Services Division (formerly known as the Office Management Division) is one of 10 operating divisions of AMA corresponding to the major areas of management responsibility. Association members are enrolled in the divisions according to their professional needs. The activities of the individual divisions are:

Administrative Services—mainly interested in equipment, systems and procedures affecting the flow of paper work.

General Management—appraises the problems of top-level planning and control, and considers appropriate courses of action.

Personnel—specifically concerned with employe and union relations, and more broadly, with human relations.

Finance—engages in activities related to budgets, profit-planning, electronics, reports, cost control and other fiscal-industrial matters.

Insurance—composed chiefly of industrial insurance buyers, with discussions conducted from the buyer's viewpoint.

Manufacturing—though largely concerned with productivity, is also occupied with engineering, purchasing and related problems.

Marketing — represents the special areas of sales, advertising, marketing and their interrelated activities.

Packaging — interested in design, equipment, materials and services affecting better packaging and shipping.

International Management — aimed to inform executives living abroad and for those in the United States responsible for operations overseas.

Research and Development—interested in the management and application of engineering research and the coordination of such activities with other company functions.

The job is never finished

AMA's stated opinion is that creating professional competence in today's and tomorrow's executives is a continuing process. In the business world, the job is never finished because managerial practices are always improving.

As management responsibilities become more complex and demanding, the reliance of executives on the research and academic facilities of the AMA become more pronounced.

Its president, Lawrence A. Appley, sees "a tremendous spread in the use of organized, scientific, long-range planning for management."

"The basic requirement for the professional manager," Mr. Appley concluded, "is that he plan a long way ahead. He does not consider that long-range planning is crystal-ball gazing and guessing. He considers it as a definite commitment as to what his organization will bring about over a given period of time. He does not wait for the future—he makes it." ■

Computer Comparison and Census Chart

Commercial Data on Digital Computers Used in Business Applications

Manufacturer, Type, Model	Price Average System ($1,000)	Average Rental ($/Mo.)	Qty. Delivered	First Shipment	Deliv. Time (Months)	Input	Memory	Output	Approx. KVA Power	Average Working Area (Sq. ft.)
Punched Card Calculators and Computers										
IBM 604	26	550	4,250	12-48	2-6	PC	VT	PC	7	25
IBM 607	42	900	500	10-53	2-6	PC	VT	PC	11	30
IBM 609	55.5	1,175	0	11-60	14-16	PC	C	PC	1	20
Univac 60	75	1,015	980	6-54	4	PC-PT	VT	PC	10	50
Univac 120	97.5	1,350		6-54	4	PC-PT	VT	PC	10	50
Large-Scale Computers ($500,000 up)										
Bendix G-20	545	15M	0	1-61	18	K-PC-MT-PT	C-MT	PC-MT-PT-Pr	15	400
Control Data 1604	1,155	32M	5	1-60	10	K-PT-PC-MT	C-MT	PC-MT-PT-Pr	20	600
Datamatic 1000	1,750	35M	6	12-57	12	PC-MT	C-MT	PC-MT-Pr	120	4,500
Honeywell 800	1,000	20-40M	0	10-60	19	PT-PC-MT	C-MT	PT-PC-MT-Pr	30	950
IBM 704 (discon.)	1,900	44M	95	12-55	-	PC-MT	C-D-MT	PC-MT-Pr-CRT	125	2,000
IBM 705 (Models I, II, III)	1,900	37M	140	11-55	15-20	PC-MT	C-D-MT	PC-MT-Pr	100	3,000
IBM 709	2,600	55M	40	8-58	15-20	PC-MT	C-D-MT	PC-MT-Pr-CRT	160	3,000
IBM 7070	900	20M	5	3-60	18	PC-MT	C-Di-MT	PC-MT-Pr	32	900
IBM 7080	2,530	55M	0	1961	18-24	PC-MT	C-MT	PC-MT-Pr	45	1,000
IBM 7090	2,880	64M	10	11-59	18	PC-MT	C-MT	PC-MT-Pr	35	1,100
NCR 304	850	14M	8	1-60	15-18	PT-PC-MT-K	C-MT	PT-PC-MT-Pr	25	1,200
Philco Transac S-2000	1,500	30M	7	10-58	12	K-PC-MT-PT	C-D-MT	PC-MT-PT-Pr	24	800
RCA 501	800	16M	25	5-59	12	K-PC-MT-PT	C-D-MT	PC-MT-PT-Pr	35	1,200
RCA 601	2,000	42M	0	7-61	18	K-PC-MT-PT	C-MT	PC-MT-PT-Pr	40	1,200
Univac I (discon.)	1,280	23M	48	4-51	-	PC-MT	DL-MT	PC-MT-Pr	120	2,500
Univac II	1,520	28M	32	12-57	12	PC-MT-PT	C-MT	PC-MT-PT-Pr	120	2,500
Univac III	1,000	20M	0	1962	18-24	K-PC-MT	C-D-MT	PC-MT-Pr	60	1,200
Univac 1103-1105	1,500	30M	45	5-50	12	K-PC-MT-PT	C-D-MT	PC-MT-PT-Pr	120	3,000
Medium-Scale Computers ($50,000-$500,000)										
Alwac III-E	114	3,450	40	2-54	1-3	K-PC-MT-PT	C-D-MT	PC-MT-PT-Pr	10	50
Bendix G-15	60	1,750	325	7-55	2-3	K-PC-MT-PT	D-MT-PT	PC-MT-PT-Pr	5	30
Burroughs 205	250	4,600	125	1-54	6	K-PC-MT-PT	D-MT	PC-MT-PT-Pr	20	900
Burroughs 220	320	8,500	41	10-58	6	K-PC-MT-PT	C-MT	PC-MT-PT-Pr	30	1,200
Burroughs B251 VRC	217	3,975	0	1961	-	K-MICR Items	C	Pr	15	80
Control Data 160	60	1,500	2	4-60	6	K-PC-MT-PT	C-MT	PC-MT-PT-Pr	1	30
GE 225	250	7,000	0	12-60	18	K-PC-MT-PT	C-D-Di-MT	PC-MT-PT-Pr	15	400
Honeywell 400	390	8,660	0	7-61	16	PT-PC-MT	C-MT	PT-PC-MT-Pr	23	600
IBM Ramac 305	190	3,200	700	11-57	12	PC-PT	Di-C-D	PC-Pr	15	360
IBM 650 (All types)	200	3,750	1,250	11-54	8-12	PC-MT-PT	C-D-Di-MT	PC-MT-Pr	20	100
IBM 1401 (All types)	224	5,850	0	11-60	-	PC-MT	C	PC-MT-Pr	10	350
NCR 390	75	1,850	1	5-60	12-18	K-PC-PT-MS	C	PC-PT-MS-Pr	3	200
RCA 301	275	5,500	0	7-61	18	K-PC-MT-PT	C-Di-MT	PC-MT-PT-Pr	15	400
Royal Precision RPC-4000	87	1,750	0	7-60	3-6	K-PT	D	PT-Pr	2	120
Royal Precision RPC-9000	120	2,450	0	7-60	6	K-PT-PC-MT	DL-MT	PT-MT-Pr	1	180
Univac File Computer 0 and 1	180-250	4-6,000	110	8-56	12	K-PC-MT-PT	C-D	PC-MT-PT-Pr	20	1,000
Univac Solid-State Computer	347	6,950	110	10-58	12	PC-MT	D	PC-MT-Pr	15	300
Small-Scale Computers (Under $50,000)										
Burroughs E101	25.5	1,000	217	11-55	1-2	K-PT-PC	D	PT-Pr	2.5	25
Clary DE-60	18	540	15	9-59	3	K-PT	D	PT-Pr	2	20
IBM 632	5.6	175	825	6-58	2	K	C	K-PC-PT	1	15
Monroe Monrobot IX	9.6	275	94	3-58	3-6	K	D	PC-Pr	.8	15
Monroe Monrobot XI	24.5	700	7	4-60	8	K-PT-PC	D	PT-PC-Pr	1	20
Royal Precision LGP-30	49.5	1,100	425	9-56	1-2	K-PT-PC	D	PT-Pr	1.5	15

Where exact figures were not available, estimates were used.

C—Magnetic Core
D—Magnetic Drum
Di—Magnetic Disk
CRT—Cathode Ray Tube
K—Keyboard
MT—Magnetic Tape
PC—Punched Cards
MS—Magnetic Strip
Pr—Printer
PT—Punched Tape
DL—Delay Lines
VT—Vacuum Tube

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Air Force

Continued from page 21

keeping up-to-date and accurate information on members of the Reserve. A man employed in a critical industry may change to a less critical job. This would mean he is available in the event of mobilization. Another reservist may get a degree in Physics, which might change his status in case of mobilization.

Added skills and capabilities, changed dependency or deferment status, or changes in availability must be changed on the master file. To get this information, the center uses a system of mailing personnel surveys to reservists. The data processing system identifies individuals who are to receive surveys, addresses the surveys to the reservists and finally controls the surveys by taking the necessary steps to follow up on the mailing.

Keeping track of changes

Another of the center's big jobs is the preparation of reports which reflect the status and changes to the Reserve. There are 27 reports of varied complexity and volume which are required by Headquarters USAF, Headquarters CONAC and the ARRC. The entire master file is processed on a systematic basis, and all information required for status reports is extracted on a monthly schedule. The system also keeps track of certain changes affecting reserve strength and summarizes these changes periodically. The reports are produced to include a report header and page number on every page for ease of interpretation.

To produce the status reports, the master file, as of the end of a month, is processed through the computer and various types of information required for the reports extracted to the tape stations. Each output is processed through further programs which sort, compose parts of reports and extract information for further processing. The tapes containing the report data are then placed on the off-line printer for printing out. As many as 15 different reports could be put on a tape station if the sequence is correct.

Information concerning certain types of changes to the master file is accumulated from the daily updating runs. At the end of the month, these changes are sent through a main system distributor run and the gain and loss distributor which channels the information to various report programs.

Extracting and printing the labels for the Air Reservist magazine is similar to the production of reports. The extract is generated monthly during an updating run. Name, grade, AFSN and address

for each reservist to receive the magazine is picked up. This information is then sorted by state, county, and city to put the names in sequence for mailing. Next the extracted file is divided into fourths and run back from four tape stations for editing to label format. The edited tape is placed on the printer and the labels are printed four abreast on paper 12 inches wide, perforated to give 3-inch labels.

Eligible officers on demand

According to Air Force regulations, a promotion selection board schedule must be established each fiscal year for each officer grade. The center's EDP system will produce, on a demand basis, the number of officers eligible for promotion consideration by grade break-down. Required rosters and control documents for board processing are also produced. At periodic times, varying with each type of board, supplements to the original rosters are prepared indicating gains and losses relating to promotion eligibility, prior to the convening of the Promotion Board. After the Selection Board has voted, rosters and EAM cards are prepared for Headquarters USAF and/or CONAC. These documents, with proper signatures, become an integral part of the board procedures.

After a waiting period for approval, the rosters containing the names of officers selected are returned to ARRC, promotion orders are published and the master file updated with new information.

The "keystone" phase of the integrated EDP system at the ARRC is computer scheduling. Without synchronized scheduling, the reports would not be current, query replies would not be accurate and Reserve participation credits may not be valid.

Scheduling the "computer hours" was a painstaking task. It involved conducting time studies, workload studies by day and month, evaluation of peripheral equipment needs and constant rescheduling due to priorities and other factors.

Under the manual system previously employed, it took 22 minutes to extract a bit of information from an officer's record. Assuming 1,000 actions a day, the total job consumed 367 man hours. While doing other functions simultaneously, the computer can do the same job in only 17 minutes.

The system has enabled the ARRC to perform its vital work without serious delay and without adding personnel. In fact, the center personnel has been relieved of much of the burden of routine, repetitive clerical operations, freeing their time for creative planning. The computer is saving real time—of immeasurable value in the event of mobilization—and it has made it possible to produce very accurate strength reports which result in a more efficient maintenance of Reserve mobilization potential. ■

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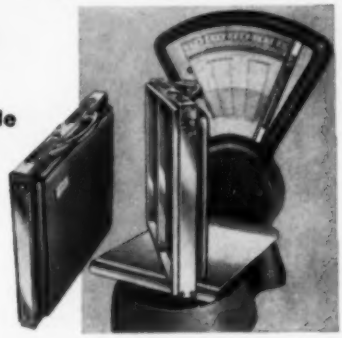

Your shipping charges are less, handling is easier, with the designed-light VPC control panels. Special screening process makes characters clean and clear. Orders filled within 24 hours. Self-contacting and Jack type wires with 12% additional pressure in pull tests. All panels unconditionally guaranteed.

VPC

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VIRGINIA PANEL Corporation

Post Office Box 1106
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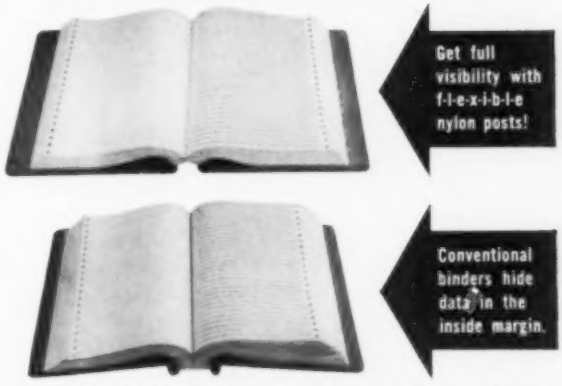
For More Information Circle Reader Service Card No. 169

WITH MARGINAL PUNCHED FORMS...

you see the entire page anywhere in the binder!



You get *full visibility* of marginal punched forms—with this Cesco Nylon Post Binder because the posts bend to reveal the contents of every page.

A single continuous, flexible nylon cord forms both posts. Besides improving visibility, this post flexibility makes sheet loading fast and easy—posts bend and align themselves with the punched holes • Its positive locking system can't slip • There are no individual posts to pull out • Binder covers lie flat for easy stacking and to save you space.

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YAWMAN & ERBE, C. E. Sheppard Co. Div.
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For More Information Circle Reader Service Card No. 170

Operations Research

Continued from page 32

and inequations) was solved with an IBM 650 data processing system in use at the IBM Service Bureau in New York City in 1956.

The problem was to plan the location and timing of additional production units during the next decade, to minimize operation and transportation costs, and to obtain optimum results. Linear programming was employed to formulate the problem and an electronic digital computer to solve it. Fortunately, a "canned" program for the IBM 650 was already available at the service bureau for such a situation, so the main work was to research the problem and then state it in such at way that it could be fed to and digested by the computer. The study took only five weeks from start to finish.

No special education

Various factors had to be considered in arriving at the mathematical model, which was of the matrix type. The businessman does not need to know the technicalities in order to understand the principles of OR techniques, as there are many experts that can be engaged for such highly specialized work. The factors used in the Maxwell House formulation consisted of the usual constants and variables. Among the items considered were: the lowest cost to acquire, manufacture, and distribute the product; forecasts of sales demand, computed in relation to population trends and geographical shifts; production capacity per plant; increased output resulting from estimates of improvement in factory automation based on past experience; plus costs of raw material, manufacture and distribution.

It is true that one has to be a trained OR technician and an expert mathematician to apply OR methods to this problem, but no special education beyond the common sense of the businessman is needed for a general understanding of the various phases of the subject.

OR is beginning to pay off, and in a big way. No sizeable business should be without its benefits. This does not mean you have to have a computer on your premises, or even employ one of the service bureaus as Rayco or Maxwell House did. In fact Coats & Clark, producers of sewing threads, determined the optimum number of branches, location of branches and the areas to be serviced by each branch without using a computer.

Competitive problems

An OR team prepared studies on four factors which had to be considered in arriving at a decision. These were: (1) Cost attributable to sales lost because of distance from branches; (2) cost of maintaining a branch (operating cost); (3) cost transportation from central warehouses to branches, and (4) transportation costs from branches to customers. These four factors were combined into a formula (the problem) and it was successfully tested in one area before it was applied to other areas.

Types of problems now being solved by OR techniques include allocation, competitive, waiting time, inventory, product mix, replacement and maintenance, routing, search and transportation.

When a task involving an allocation problem is faced, there are three things to consider in carrying it out: (1) The task (job, activity, service); (2) The facility or resource (machine or person); (3) The methods of performing the task. The total cost of performing the task can be minimized if all three of the above are not fixed. For example, if there are alternate methods of performing the task, if there are various facilities available for performing the task, or if there is more than one task to be performed, then proper combinations of the variables will allow a minimum cost. Minimizing the total costs incurred in performing a task, with consideration of the variables involved, constitutes the allocation problem.

Competitive problems are those in which two or more parties acting independently strive for an identical goal. Their individual actions are, however, governed by the necessity to end up with the lowest possible loss no matter what action their opponent takes. By simulating competitive situations, costly experiments can be eliminated. The military usually simulates battle conditions to test tactical effectiveness. Industries simulate market and productive processes for management training, and an increasing number of these competitive problems are now being solved by OR.

Problems in waiting time occur when units requiring service arrive at a service point where facilities may or may not be available for processing. Since units and facilities are seldom in balance, costly delays are normally the rule. These costs may be expressed in terms of wages for idle employes, idle inventory or idle facilities. Waiting time problems are common wherever queuing occurs. Examples of this are whenever material or machines are waiting for work as in factories or wherever people are lined up as in banks or at ticket counters.

Four types of waiting time problems can be handled by OR methods—the facilities problem, scheduling problem, sequencing problem, and line-balancing problem.

The facilities problem arises when the arrival of units is not subordinate to control, the ordering of available units for service is specified by rules, the number of service facilities is subject to control and each facility can perform all the required services.

Determine the order

The scheduling problem is similar to the facilities problem except that the timing of the arrivals, rather than the amount of facilities, is subject to control. It occurs in scheduling transportation facilities into such places as air-fields, train terminals or unloading docks or platforms.

The sequencing problem appears when a set of units is available for service and availability can be controlled, the service required must be performed by a chain of specified facilities and when the sequence of operations that must be performed for the various units differs either in the operations required, the order of operations and/or the dura-

tion of the operations. The problem is to determine the order in which the units should be serviced in order to minimize the total elapsed service time.

The line-balance problem comes about when arrivals are subject to control and all units require the same multiple operations to be performed on them. The problem is how to combine the operations to be performed into work stations to minimize the total service time. Ideally, the solution consists of forming the work stations so that the service time at each is equal. The units then can flow at a constant rate and not accumulate before any station.

Variables can be altered

With inventory problems there is a stock of goods on hand, held for future delivery to expected customers. Costs are incurred whenever an inventory must be carried. These costs are incurred in obtaining the goods (labor, raw material, transportation), in holding the goods (storage, handling, taxes) and in shortages of goods (loss of sales). In creating goods for inventory, there are cases when the time of producing the goods can be controlled but the quantity produced cannot. There are cases when the time of producing the goods cannot be controlled and there are cases when both the time and the quantity of production can easily be controlled. The time and the quantity in creating goods for inventory are the variables that can be altered in optimizing a solution to an inventory problem in order to minimize costs.

The compositions of various metals (high temperature alloys), foods (cereals, animal feeds), chemicals (fuels, pharmaceuticals) or other products can often be varied without losing the desired characteristics when applying OR to product mix problems. Proper selection and amounts of raw materials used result not only in obtaining the desired product characteristics but also in minimizing the total cost. It is necessary to know the quantitative contribution of each of the raw materials to each of the product characteristics restricted by the product specifications. Determining the product composition, that is, the percentage of the various raw materials, is the product-mix problem. This type of problem is usually formulated by linear programming. The solution is long and repetitive, and is therefore often obtained by using a digital computer.

Replacement problems, sometimes called replacement and maintenance processes, fall into two classes. A component or equipment is replaced because it deteriorates, or becomes obsolete, or is subject to failure. If a machine deteriorates or becomes obsolete, it will be less efficient than a new machine. This problem has been solved for only a few restricted cases, but has wide application in all lines of business and industry.

If the component is subject to failure, as for example a bearing, the problem is to determine which should be replaced and how frequently it should be replaced so that the costs attributable to the component, the cost of replacing and the cost associated with failure of the unit are minimized.

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American Cancer Society

The routing problem is one of finding an optimum route for minimizing the travel cost and time of persons or products. This is related to the transportation problem.

A variety of transportation problems are solved by OR techniques. For example, a common transportation problem is the distribution of goods available at each of several factories at minimum freight costs. If the quantities of goods needed by distributors and the quantity which can be supplied by each factory are known, the problem is to minimize total freight costs by finding out how much should be shipped from each factory to each distributor.

There are many types of search problems, from looking for information in files to searching for ships at sea. There are, however, only two variables of immediate importance in search problems; first the procedure for carrying out the search, and second, the location of information or items sought.

Minimize cost

In the first case, where the search procedure can be controlled but the location of the information is not known, there are two types of problems to be solved; first, minimizing the expected cost of errors by determining, relative to fixed resources, what and how many observations to make and what amount of care should be taken in making these observations (this is sometimes termed optional auditing), and second, determining the time and/or money to spend in the search procedure which will maximize the use of the collected information, but minimize the cost of collecting it.

Fortunately, the businessman does not have to know the complex mathematical formulae involved in Operations Research. What he must realize, however, is that with a bona fide practitioner, OR can greatly aid his company's present efficiency and future planning. It proves that scientific management is far more remunerative than crystal ball gazing. ■

The above article was compiled from "Office Automation—Operations Research" looseleaf handbook service published by Automation Consultants, Inc., 155 Fifth Ave., New York 10, N. Y.

IBM 7765 transfers data on punched paper tape to magnetic tape for direct computer input at speeds of 150 characters per second.

An MBA Product Preview

New Paper Tape to Magnetic Tape Converter

HIGH-SPEED transferal of data on punched paper tape to magnetic tape can now be achieved at a rate of 150 characters a second with the new IBM 7765 converter.

The new unit will convert most paper tape in use today to magnetic tape, which can be fed to a computer at speeds of 15,000 to 22,500 characters a second. An IBM spokesman explained that the converter will accept five-track telegraphic code tape and the IBM eight-track (858) code. Other paper tape codes, not exceeding six bits per character position, may also be processed, and it is possible to convert still other codes with modification of the equipment.

Tape widths accepted by the unit are the 11/16, 7/8 and 1-inch tapes in the form of reels, rolls or strips. The 7765 has the unique ability to process both chad (punched hole) or chadless (punched flap) paper tape. Output is the seven-track, 200-character-per-inch Mylar magnetic tape used on IBM tape units.

The company foresees the new unit as bringing paper tape users into the sphere of Tele-processing —transmitting and processing data over physical distance. With the use of the converter, data can be transmitted to the computer at several times the speed of the fastest direct paper tape input. It is also much faster than any system which would require converting the punched tape data to cards and then tape for computer input.

IBM looks at the 7765 as useful for government agencies, utilities, railroads, aircraft firms, primary metal producers, and general manufacturing industries which often have hundreds of devices generating paper tape in high-volume applications. Order-processing, billing, inventory control and engineering information will flow into the computer at higher rates of speed.

The 7765 has a self-checking feature to catch errors and a center-roll feed device to eliminate rewinding of tape rolls. Rental is $1,475 a month. Circle No. 125

An MBA Product Preview

GE Enters Medium-Priced Computer Field

The new GE-225 computer system goes through its paces at the Computer Department facilities in Phoenix, Ariz. This system marks GE's entry in medium-price field.

AIMING at a broad business and scientific market, General Electric's Computer Department actively entered the medium-priced, general computer field with the announcement of the GE-225 system.

This first bid by GE for the general purpose market incorporates a newly-developed "General-Compiler" programming technique which automatically translates English words and symbols into machine language. The system is equipped to handle all types of library routines. Generators, as well as open and closed sub-routines, are provided as a part of a basic library.

The full system includes a central processor with control console, console typewriter and card reader; a magnetic tape system; card punch; a mass random access file memory, and a magnetic ink document sorter.

For flexibility, the GE-225 has repertoire of 59 operational codes exclusive of input and output commands. It has three registers for automatic address modification to reduce storage requirements for the program and to reduce coding costs while increasing the speed of the operating program.

Another feature is the "data mating" function, a data-buffering and priority-assigning component of the central processor. Through the use of plug-in connectors on this device, rapid additions and substitutions of peripheral equipment used in conjunction with the system is made possible.

The computer has been designed to communicate with special purpose input-output devices such as are used to measure and control temperature, pressure and speed. The GE-225 can also be linked to a GE-312 Process Control Computer for direct computer-to-computer communication.

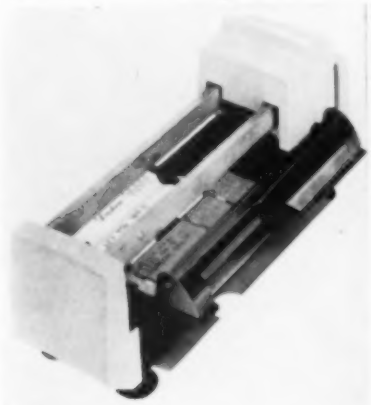
Remote data entry, via high-speed transmission lines, is possible with the computer from widely separated geographical locations. With optional facilities, the 225 can process orders, inventory control, and payroll from information originating at remote offices or warehouses.

The new computer is priced in the $125,000 to $400,000 range, leasing from $4,000 to $12,000 monthly. Circle No. 124

MBA Showcase

New Products for Business Automation

Credit Card Imprinter



A single imprinter, the Datawriter 19X3, will accommodate all sizes of popular credit cards and business forms without adjusting. Time and trouble can be saved in retail credit card transactions with this Dashew Business Machines Co. innovation. In addition to the built-in universal features, the 19X3 operates with either an inked or rubber impression roller and handles both metal and plastic plates. Circle No. 101

New Photocopy Machines

Smith-Corona Marchant announces three photocopy machines, the Vivicopy 14 for paper up to 14 inches wide yet suitable for desk-top operation, the Vivicopy 12 for 12-inch capacity with full feature ability and the Vivicopy 9, the small office and departmental model. A selection of bond quality white sensitized paper, paper dispensers, automatic refill cartridges and all accessories necessary for complete photocopy production fill out the line. All models operate on the diffusion transfer principle, utilizing light and disposable developer for instant transfer. Circle No. 123

Check-Processing Machine

The T-142D check-processing machine will write, sign, protect, date, count and completely tabulate items at speeds up to 2,000 an hour. Complete disbursement control is assured as checks are written and protected, listed, dated, counted and delivered to a locked vault. Totals or sub-totals may be taken at any time by a "total lock" built into the machine, preventing unauthorized persons from clearing it. It has a nine-band keyboard and control knobs are located up front for the operator's convenience. With simplified operation and less operating room the machine is also handsome, styled in beige and blue. Unit and variations are from the Todd Div. of Burroughs Corp. Circle No. 121

Punched Paper Tape Code Converter

Five, six, seven or eight channel tape may be converted from one code system to another, automatically, at 1,180 codes per minute with the new Punched Tape Code Converter from Friden, Inc. Eight-channel systems tape, for example, may be converted to five-channel wire-transmission tapes, or to other channels for Graphotype address plate-making, computer input, and machine tool control. The unit can also be obtained with a special punch and reader which will enable tapes to be converted for Teletypesetter operation. To operate, a power switch gets the converter ready, a tape-feed switch feeds the tape out, a start-read toggle causes tape reading to begin. Simultaneously, code conversion occurs through the control panel, and codes are punched in the output tape. Indicating lights tell when the power is on (white) and when a parity error has been made (red), as indicated by a parity check feature. Circle No. 105

New Electric Collator

An electric desk-top collator is the newest in a line of collators announced by General Binding Corp. in conjunction with their affiliation to Collamatic Corp. The portable machine weighs 25 pounds and delivers collated sets of pages automatically—as many as 1,800 collated sets per hour. The new affiliation is to round out GBC's line and create a fully integrated paperwork system. Circle No. 104

Telephone-Type Intercom

To round out its line of intercom equipment, the Webster Electric Co. announces a new version of the low cost, utility telephone-type intercom system, designated the IP8 series. Push button telephones and one central power unit can connect from two to nine or more persons for immediate conversation. The power unit takes little space and can be plugged into a 110-120 volt outlet. Low cost, simple operation and easy installation are its highlights for any home or small business. "Buzz" or chimes and "all-call" features are optional. Circle No. 111

Battery Powered Eraser

An eraser operating on standard flashlight batteries suitable for exacting work is released from the Jet Corp. of America. The Qwik Electra Eraser spins at 4,500 rpm, eliminating ballpoint, ink and typing errors without smudging. Single letters or numerical errors can be erased without marring adjacent characters. Corrections are made without slipsheets on multiple carbon copies as speed not pressure is used. The eraser weighs six ounces and is finished in bronze color. Circle No. 117

Piggy-back Tab Form

A time-saving tabulating form called "Redi-Check" consists of a multi-part, carbon interleaved, continuous form carrying a 3¼" by 7⅜" detachable tab card check on the face of part one. Consolidated Business Systems, Inc. announces the forms as being flexible in systems and procedures applications to accounts payable, inventory control, purchasing, invoicing, cost control and sales analysis. They are available in depths of 5½" to 11" and widths up to 25". In alignment for tab equipment (and typewriters) forms can be pre-punched with any constant sorting code. Circle No. 112

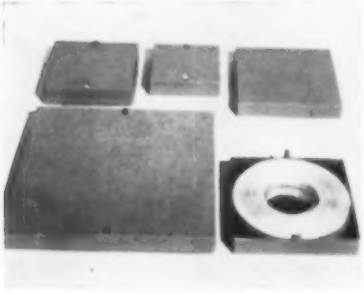
Elapsed Time Computer

With input data in machine accounting and complete data processing automated, another large single cost factor—labor time and machine time—may now be automatically determined for cost control information with an automatic elapsed time computer designed and engineered by the Calculagraph Co. Used either for single item computation or as an integral component of any planned or existing cost control systems, the computation is simultaneously printed. Weighs approximately 16 pounds, all-over dimensions are 8 1/8" by 9 7/16" by 10 19/32". Powered by an electrically driven motor. Circle No. 113

Punched Paper Tape File

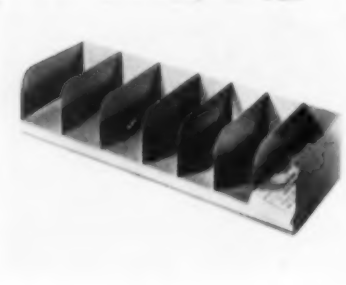
A tape-holder and vertical visible filing method for the master paper tapes used in repetitive data processing operations has been developed by the Shaw-Walker Co. The tapes may be used in such capacities as preparing sales orders, purchase orders, bills of lading and invoices. A signaling device which aids speedy return of the tapes to the file has been incorporated. This saves up to one-half the filing time in some cases. Tape holders are locked in the cabinet for use only by authorized persons. Cabinets save up to 40% of floor space in an office and are suitable for use in large or small installations. Circle No. 106

Punched Tape Mailers



Full rolls of punched tape may be mailed safely in large heavy duty mailers just put on the market by Dresser Products Inc. These mailers take a full roll of punched tape, measure $9\frac{5}{8}$" by $9\frac{5}{8}$", and are an inch deep. Four, five and six inch sizes are also available. They are equipped with metal closing tabs and protect tapes not only for mailing but for storage. Company has full line of "Tape-File" DP accessories. Circle No. 103

Check and Bill Sorter

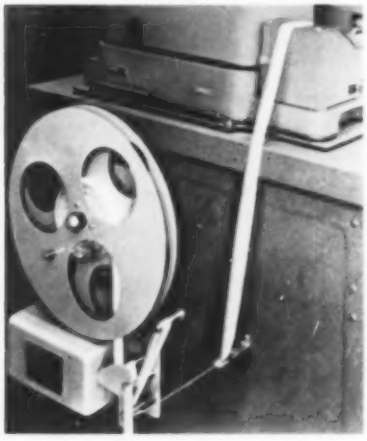


A new check and bill sorting rack which speeds the sorting of checks, invoices, bills and other similar materials, is now being manufactured by the Lit-Ning Products Co. These efficient racks come in a choice of standard colors; grey, tan, mist green and green. The Model 7 CS has seven compartments, weighs $6\frac{1}{2}$ pounds and measures 5" by 24" by 8". Three other models vary in size and number of compartments. Circle No. 110

Fine Figure Pens

Pens suitable for work flow jobs and other activities where speed and accuracy are important, as in systems and methods departments, are now available from Gardner Rubber Stamp Co. Called their Super-Riter, the fine writing ability is attributed to a Superthin Ball Point with a $5\frac{1}{4}$" cartridge which contains pretested Formulabs inks. Accountants, auditors, bankers, bookkeepers and secretaries find them useful for visible record card, chart and other fine figure work. The pens come with red, blue, jet black and green ink. Circle No. 107

Perforated Tape Winder



A tape winder which is low in cost, simple to operate and lightweight, mounts on teletypewriter equipment and converts to a portable unit, if desired, is introduced by Comptometer's Western Apparatus Div. Designed for use in storing of transmittal tape used in integrated data processing and automatic letter typing, the winder is equipped with a 12-inch metallic reel capable of holding up to 2,000 feet of fully perforated tape. Tension is adjustable and the reel is magnetically held to the frame. Circle No. 122

Stencil Duplicator

An electrically operated silk screen stencil duplicator with clean automatic inking, two-speed motor and a built-in jet stream delivery is distributed in this country by Mercury Business Machines Co. This West German Roto 423 Dynam duplicator, called Autodynamic, has an inking device consisting of a self-propelling pressurized ink can coupled to an inking pearl of fine pipes and wire-thin nozzles. Ink is regulated for distribution in four printing zones. The entire system is clean, and color change is fast. Prints up to 180 copies per minute. Circle No. 115

Center Guide Ream Cutter

To ensure performance and accuracy on their Premier Ream Cutter, Martin-Yale, Inc., has incorporated a new center supported guide that travels on a ground and polished shaft. Gauging the paper enables the operator to achieve greater accuracy, efficiency and paper rigidity with less strain. Paper up to two inches thick by 18 inches wide may be cut cleanly. Circle No. 102

Copies On Request

Univac Service Centers — How smaller utilities can speed billing and cut costs by taking advantage of electronic data processing is the subject of a brochure from Remington Rand. Advantages of service centers from cost to the mechanics of operation are described. Circle No. 131

Auditor's Point — The Gardner Rubber Stamp Co. has issued a new catalog on specialized auditor's pens and pencils which are also useful to systems and methods departments and in work where detailed and accurate writing is required. Circle No. 132

Tabulating Card Guides—Solutions to the recurring problems of how to file cards, tapes and ribbons in a data processing installation are offered in a brochure by Smead Mfg. Co. Automation filing essentials—filing procedures and supplies are described. Circle No. 133

Work Organizers—A complete description of Wassell Organization Inc. rotary work organizers including equipment and methods is available in a 20-page booklet. A pull-out sheet of efficient floor plan organization is attached. Circle No. 134

Cormac Photocopy Line—A catalog folder shows the complete line of photocopy equipment and accessories manufactured by Cormac Photocopy Corp. Each machine is clearly illustrated, described and specified for operating features, capacity and physical dimensions. Circle No. 135

IDP Ideas for Automation/Labelation—Case histories and data processing ideas for various labelling applications—addressing and correcting, accounting and billing, coding and marking and sales inventory and production control—are described in an IDP Idea Folder from Allen Hollander Co., Inc. Circle No. 136

Copyflex One-Writing System Gets Accounting Reports Out—Days Earlier!

Bruning Copyflex copying machines do more to speed and simplify accounting paperwork than any other paperwork machine on the market.

Copyflex flexibility lets you reproduce, from one worksheet or form, any series of comparative, cumulative, or consolidated reports and schedules. You write or type information once on the original form, add or change information whenever desired, make up-to-date Copyflex copies at any point for distribution. No clerical retyping or rewriting of repetitive data. No proof-reading. No copying errors.

Copyflex will fit in with any forms or electronic data processing equipment you are now using. Whether it's a multiple-part continuous form or a snap-out set, you simply include a translucent part which can be used by Copyflex to reproduce additional copies.

Copyflex gives you sharp, black-on-white copies (color-coded if desired) for as little as a penny each for materials for letter-size. A small Copyflex machine costs no more than a standard typewriter. You have everything to gain by mailing the coupon.

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NEWS

WU Automates Telegram Reception

These "burster" printers are part of Western Union's new telegram receiving system. Messages are automatically received, printed, detached, routed on conveyor belts and another blank set without human handling. Their effectiveness was proven on the large scale at the Republican National Convention on July 25.

A new telegraph receiving and switching system was inaugurated at Western Union in Chicago last month. The switch to automatic telegram reception means that service is now speeded between any Western Union office in the country to Chicago's 3,000 business and industrial users and 58 branch offices in less than an hour, with almost no human intervention.

Telegrams are directed to "switching aisles" in the Chicago office, simultaneously punched and printed on paper tape and routed by the operators, either directly to offices or to the "burster" printers, which create written telegrams for delivery by hand or to offices with facsimile service.

The Chicago office, handling over 25,000 telegrams a day at faster speeds with less personnel, marks another step in Western Union's program to automate its entire operation. Sending messages automatically was completed just after World War II. The move to automate telegram reception is completed in Washington and Chicago, in progress at New York and will eventually be used in 15 major cities.

C-E-I-R and General Analysis Merge

C-E-I-R, Inc., of Arlington, Va., has signed a contract with General Analysis Corp. of Calif. for an economic merger, which went into effect on July 1, with C-E-I-R the surviving corporation.

Since 1955 GAC has engaged in the same operations as C-E-I-R with activities ranging from war gaming and operations analysis to economic surveys and data processing. GAC's offices in Utah and Arizona with headquarters in Los Angeles will increase C-E-I-R's development of a West Coast Research Center. GAC will also supplement C-E-I-R with its well-trained professional staff.

OEME Sets NYC Date

The first presentation of the Office Equipment Manufacturers Exhibits for New York City will be at the Coliseum on April 17-21, 1961, E. D. Taylor president of OEM Institute has announced.

WESCON Schedules 40 Technical Sessions

More than 200 nationally recognized authorities in the field of electronics and related technical areas will participate in the 1960 Western Electronic Show and Convention held in the Memorial Sports Arena at Los Angeles on August 23-26.

Presentation of new developments in technical fields will range from contributed papers, symposiums, panel discussions, invited speakers and workshop sessions.

This year WESCON will innovate a women's program entitled, "Engineering: The Woman's Role."

The four workshop sessions, one each day will be: "Management of Manned Machine Systems"; "Analysis of Manned Machine Systems"; "Synthesis and Design of Manned Machine Systems"; and "Operation and Training of Manned Machine Systems." Technical programs will include such subjects as Systems and Maintainability, Communications: New Solutions to Some Old Problems, Instrumentation, Circuit Theory, Semi-conductor Devices, Computers-General, Computer Circuits and Devices, Microwave Theory and Techniques and Microminiturization to mention a few.

Constant count of registrants will be kept on electronic counters with up-to-the-minute records of attendants and their names. Identification will be facilitated by pre-coded guest cards from companies' representatives. Written lists of delegates will be available, as well as, it is hoped, a filmed record of registration and other WESCON activities.

The Memorial Sports Arena, used last month by the Democratic National Convention will gain six new "rooms" for technical sessions by draping off the seating area of the concourse, an open-air restaurant shaded by the central pedestrian bridge, and a 56,000-square-foot annex of exhibit space fully air-conditioned all especially for WESCON.

NMAA and SPA Elect

Merlyn Kirkwood (left), outgoing president of the Philadelphia Chapter NMAA, hands the gavel to the 1960-61 president, Roger B. Gregory.

While the country is hot in political elections other newly elected presidents of associations are also taking a place in the news.

The Philadelphia Chapter of the NMAA boasts of the youngest president of the NMAA at 25 years old with Roger B. Gregory, president of Electronic Data Processing Corp. Gregory is dedicated to the growth, education and advancement of data processing in the Philadelphia area.

Other NMAA new presidents are: John J. Wilk, Union Carbide Plastics Co., of the New York Chapter; Bernard J. Arnold, supervisor of the tabulating department at Yale and Towne Mfg. Co., of the White Plains Chapter; Jack Loufman of Price Waterhouse and Co., of the Pittsburgh Chapter; James E. Perry, electronics research office of the First National Bank of Arizona, of the Phoenix Chapter; W. E. Vincent, of the Chattanooga Chapter.

The Systems and Procedures Association has among those on its new roster of presidents: Joseph H. Richmond, systems manager of the Reuben H. Donnelley Corp., of the Washington Chapter; William C. Kramp, financial planning co-ordinator for Texas Instruments, Inc., of the Dallas Chapter; Victor E. Lauitsen, manager of marketing systems in the Methods and Procedures Div. of the Burroughs Corp., of the Detroit Chapter; and Roy Slama, controller of St. Mary's Hospital, of the Minneapolis-St. Paul Chapter.

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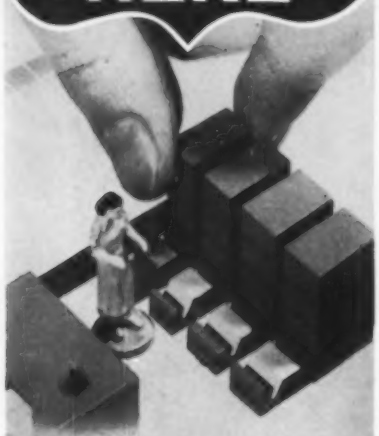

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MBA Reviews

Computers and People

By John A. Postly. Published by McGraw-Hill Book Company, 330 West 42nd, New York. $6.

Sub-titled "Business Activity in the New World of Data Processing" this book describes the function and varied applications of computers without neglecting man's important role in the process.

This account is realistically keyed to the future usefulness and effect automation will have on people while transforming the business administrative world.

Emphasizing the fact that control of the computer's role will come only with man's complete understanding of his machines, Postly attempts to take the mystery out of automation.

For those who want to be "in the know" on the full possibilities and responsibilities of automation and what man's role will be, this book is an outstanding preview.

Automation and Society

Edited by Howard Boone Jacobson & Joseph S. Roucek. Published by the Philosophical Library, 15 East 40th, New York. $10.

A conglomeration of writings designed to show automation as an intellectual and sociological advancement as well as a technological development.

Section I—"The Rise of the Conception of Automation" gives a thorough history of automation with insight. Section II—"Automation Applies" is an account of applications in the automobile, metal works, electronics, communication, railroad, teaching machine, accounting, small and large business and telephone industries. Section III—"Automation and Responsibility" is sometimes confusing if not speculative about the future of automation. The last chapter deals with automation in Russia, as reported by Russians.

An "Automation Dictionary" and "Thirty-Seven Short Case Histories in the U. S. and Canada" comprise the appendixes.

A book generally not as impressive as its table of contents. Although many of the accounts therein are shallow some of them are provocative.

Classics in Management

Edited by Harwood F. Merrill. Published by the American Management Association, 1515 Broadway, New York 36, $9.00 (AMA members $6.00)

These readings testify to the dynamic growth of management, both as a profession and as a science —if not an art as well.

Significant essays tracing the development of management are contributed (many out of obscurity) from the works of Robert Owen, Charles Babbage, Fredrick Winslow Taylor, Henry Laurence Gantt, Russell Robb, Harrington Emerson, Frank Bunker, Oliver Sheldon, Mary Parker Follett and George Elton Mayo, to mention a portion of historic management writers.

Management theory and practice as it has endured through history is reviewed in this well-edited anthology.

Studies in Coordinate Indexing, Volume V

Compiled by Dr. Mortimer Taube. Published by Documentation Inc., 2521 Connecticut Ave. N.W., Washington 8, D. C. $5.

This book is the fifth in a series by Dr. Taube, "Emerging Solutions for Mechanizing the Storage and Retrieval of Information" (entire set—$22.50), telling of the progress made in applying the theoretical work described in earlier volumes.

Documentation, Comac, IBM 900 Special Index Analyzer and Universal Card Scanner for Punched Card Information Searching Systems, and Magnacard are all discussed in detail.

A very up-to-date, definable account of ways to solve information retrieval problems.

MBA's Calendar

August 23-25—Annual Meeting-National Conference of the Association for Computing Machinery, Marquette University, Milwaukee, Wisc.

August 23-26—Western Electronic Show & Convention, sponsored by the Western Electronic Manufacturers Association and the Los Angeles-San Francisco Seventh Region of the IRE. Sports Arena, Los Angeles.

September 14-17—Annual National Business Forms Associates (NBFA) conference, at Chase-Park Plaza Hotel, St. Louis, Mo. Write: NFBA Headquarters, 409 East Broward Blvd., Fort Lauderdale, Fla.

September 26-30—15th Annual Meeting of the Instrument Society of America and Third Instrument-Automation Conference and Exhibit of 1960 at the New York Coliseum, New York City.

October 10-12—International Systems Meeting (SPA). Hotel Commodore, New York City. Write International Headquarters, Systems & Procedures Association, 4463 Penobscot Bldg., Detroit 26, Mich.

October 10-12—National Convention, NABAC, the Association for Bank Audit, Control and Operation. Statler Hotel, Los Angeles, Calif. Information from Jack Craddock, NABAC, 38 So. Dearborn St., Chicago 3, Ill.

October 19-22—American Records Management Association's Annual Convention and Records Management Workshop, at the Plankinton House, in Milwaukee, Wisc.

October 20-22—Seventh International Meeting of the Institute of Management Sciences. Hotel Roosevelt, New York City. Session on Computers in Simulation. Information from James Townsend, 30 East 42nd St., New York 17, N. Y.

October 22-26—29th Annual National Conference of the Controllers Institute of America at the Hotel Fairmont in San Francisco, Calif.

October 24-28—National Business Show, Office Executives Association. At the Coliseum, New York City. Contact George H. Gutekunst, Jr., NBS, 530 Fifth Ave., New York 36, N. Y.

October 26-27—Computer Application Symposium sponsored by the Armour Research Foundation of the Illinois Institute of Technology, Morrison Hotel, Chicago. Write Andrew Ungar, Armour Research Foundation, 10 W. 35th St., Chicago 16, Ill.

November 1-4—The Business Equipment Exposition, second major equipment show sponsored by the Office Equipment Manufacturers Exhibits, Inc., at the Los Angeles Memorial Sports Arena in Los Angeles, Calif. Write: OEME Headquarters, 777 14th St., N. W., Washington 5, D. C.

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EDITORIAL

No War With Consultants

Several of our good friends in the consulting field have wondered, in writing, whether publication of the Parkinson article (July, MBA) signalled a declaration of war against the profession. The answer is, of course, negative.

We found the professor's article refreshingly candid and expressing more than a bit of truth. While certainly not an indictment, it was meant to be more than mere entertainment.

The consulting profession has its share of phonies; perhaps more so in the data processing field than in any other. But there are enough reputable men and organizations available to offset amply the charlatans and if management gets stuck with a phony it has nobody but itself to blame.

The greatest danger in using consulting services is that they become a crutch rather than a cure. Some staffs will lean upon them for every decision, not because of faith in the consultant, but because of fear of having to justify a decision of their own. The reputable consultant, recognizing this situation, will expose it regardless of the positions of the men involved.

Many consulting firms have been doing a particularly outstanding job in connection with business automation. This fast growing field is faced with a critical shortage of management and systems talent, providing an excellent opportunity for profitable use of consulting assistance. Expert knowledge of equipment can be valuable in making a selection from many competitive systems available today. The consultant can do much to break down the political barriers that so often impede the efficiency of data processing. They can assist in the selection of qualified personnel to install and operate the system.

We're not recommending that every firm considering some application of business automation start by engaging a consultant. Certainly it is to the firm's advantage to have such a man as a member of its own staff, and every effort should be made to uncover or secure these talents from within the organization. If the firm has a good systems man, more than likely he'll be able to fill the bill.

On the other hand, if one must go to the outside for assistance, we recommend the same care in selection as if one were seeking a medical specialist. Personal references from other firms who have used the services of consultants is probably the best guide to reliable assistance.

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will handle all four types of data processing

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The Philco 2000 Computer is the most versatile large scale data processing system available today. This one computer can handle efficiently all four major types of data processing problems, each usually requiring a different system.

The high speed input-output system updates an inventory of 500,000 items in less than 20 minutes; large complex scientific computations are now being solved in one fourth the time formerly required; and Philco 2000 Computers are now solving problems vital to the national defense effort.

The Philco 2000 is easily utilized for any of these applications. Parallel logic and asynchronous mode of operation permit expansion without costly changes in system design or existing programs. This extreme versatility is one more reason for the proven economy of the Philco 2000 . . . the computer that has changed the industry.

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ONLY HONEYWELL GUARANTEES ITS SYSTEMS WON'T DAMAGE YOUR TAPES!

NOW...HONEYWELL EDP SYSTEMS AIR-CUSHION MAGNETIC TAPE TO PROTECT VALUABLE RECORDS

Honeywell electronic data processing scientists have developed the world's most reliable tape drive mechanism. It virtually eliminates the common causes of tape damage which can shut down the equipment for costly minutes or hours. This new technique is so reliable that Honeywell is the only computer manufacturer that guarantees its Systems will not break or damage your tapes during processing. If they do, tapes will be replaced without charge.

NO PINCH ROLLERS — ANYWHERE. Only Honeywell 800 and 400 high-speed Systems transport magnetic tape *by air* throughout the processing cycle. Vacuum capstans take the place of old-fashioned pinch rollers, dramatically reducing wear and tear, flaking and scratching. The recording surface is touched only by the recording head and only when information is read or recorded. Since nearly every read-write error can be traced to tape surface damage, it is clear why Honeywell tape drives are intriguing managements in all parts of the business world.

ADD ORTHOTRONIC CONTROL — AND MAKE SURE. Added to this advanced technique of vacuum transport is Honeywell's exclusive Orthotronic Control, which insures uninterrupted accuracy during processing. Using Orthotronic Control, Honeywell Systems can re-create lost or damaged data instantaneously — without human aid, without reprocessing. Errors can be detected and corrected *automatically* in 1/20th of a second. Where other systems would stop and blink signals for human help, Honeywell 800 and Honeywell 400 will simply do what needs to be done and keep humming right along at top speed.

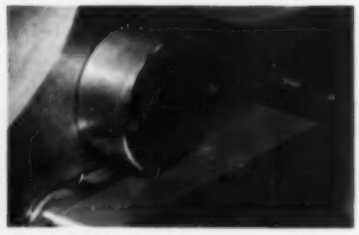
ELIMINATE UNPRODUCTIVE MACHINE TIME. This self-correcting ability plus the protection inherent in airborne tape combine to boost your profit potential on any data processing application. These Honeywell scientific advances help eliminate machine downtime, which methods men know can often cancel the economic gains of electronic data processing.

INVESTIGATE HONEYWELL 800 AND 400 SYSTEMS. Greater reliability in data recording is but one of the several major factors that multiply the cost advantages to users of Honeywell EDP Systems. If your company is now considering the move to electronics, we respectfully suggest you put Honeywell Systems at the top of your list for investigation. Our applications engineers will be glad to discuss your individual requirements.

For more information, get in touch with your nearest Honeywell office. Or write Minneapolis-Honeywell, Datamatic Division, Wellesley Hills 81, Massachusetts; or Honeywell Controls Ltd., Toronto 17, Ontario.

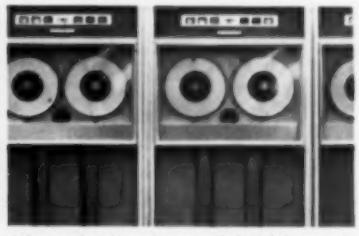
WHY HONEYWELL RECORDING TECHNIQUES ARE FASTER, MORE RELIABLE

Vacuum capstans propel tape gently and precisely throughout processing cycle, removing danger of damage by pinch rollers.



Recording head alone touches recording surface of magnetic tape, reads information with tape moving forward or backwards.

Tape changes can be made in less than 25 seconds. Changes on other data processing systems often require several minutes.



Information is read or recorded with tape moving 120 inches per second, a transfer rate of 96,000 decimal digits per second.

Honeywell

Electronic Data Processing